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Risk Management for Drinking Water Supplies in Developing Countries – The Influence of Culture on Water Safety Plans

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Risk Management for Drinking Water Supplies in Developing Countries – The Influence of Culture on Water Safety Plans

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ABSTRACT

Consumption of unsafe water in developing countries results in considerable number of illnesses and deaths annually. The World Health Organization and the International Water Association are promoting the use of water safety plans (WSPs), a risk management approach aimed at attaining water safety. This study investigated how culture impacts on the implementation of WSPs in these countries. Combining interpretive and critical paradigms resulted in the choice of qualitative methodologies utilizing multiple-case studies. Cases from India, Uganda, and Jamaica are each embedded with three units of analysis: promoters of WSPs, water utilities and their customers. Thematic analysis of data generated from semi-structured interviews, field observations and documents revealed eleven cultural factors impacting on the implementation of WSPs. Analyses of these factors led to various groupings and the subsequent development of a taxonomy categorizing these factors as being either enabling, limiting, or neutral in relation to WSPs. Findings show all the limiting factors to be deviations from the values and principles on which they are built. The findings have also led to the development of a culturally adapted risk management framework. This four-step cyclical & iterative framework is designed to address the impact of culture on the implementation of WSPs. The implementation of WSPs will take time and will require continuous improvement to the process. The successful management of drinking water risks in developing countries will require a broad institutional approach and a concerted effort that involves institutions beyond the water utilities. As such, targeted recommendations are first made towards achievement of good governance. Activities that will lead to the embracement of WSP by stakeholders along with suggestions to attain its institutionalization are also put forward. Recommendations towards addressing negative cultural factors include suggestions on dealing with: pollution causing rituals, bettering storage related practices, addressing excessive water use in rituals, counteracting belief that water should be free, fighting corruption and improving compliance, changing deliver-first safety-later attitude, and improving knowledge management practices.

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DEDICATION

This Thesis is dedicated to my late father, Yussuf Omar Hussein, whose departing words gave me the desire and commitment to seek knowledge.

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LIST OF ABBREVIATIONS

CDC	Centre for Disease Control
DFID	Department for International Development
GDWQ	Guidelines for Drinking Water Quality
HACCP	Hazard Analysis and Critical Control Points
HMWSSB	Hyderabad Metropolitan Water Supply and Sewerage Board
IHS	Institute of Health Systems

IWA	International Water Association
LAC	Latin America and the Caribbean
NEERI	National Environmental Engineering Research Institute
NEPA	National Environment and Planning Agency
NIC	National Irrigation Commission
NWC	National Water Commission
NWSC	National Water and Sewerage Corporation
OUR	Office of Utilities Regulations
PAHO	Pan American Health Organization
USEPA	United States Environmental Protection Agency
WRA	Water Resource Authority
WEDC	Water, Engineering and Development Centre
WHO	World Health Organisation
WSP	Water Safety Plan

LIST OF PUBLICATIONS AND PRESENTATIONS

- Summerill, C., Omar, Y. and Pollard, S. (2011), "Developing a supportive organisational culture", in Breach, B. (ed.) *Drinking water quality management from catchment to consumer*, International Water Association, London, pp. 13-26.

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1 INTRODUCTION

1.1 Research Background

Vulnerability to risk is considered to be among the main features of poverty (World Bank, 2000) and lack of safe water perpetuates the entrenchment of poverty (WHO, 2007). There are an estimated 2.4 million deaths each year, contributing to over 73 million Disability Adjusted Life Years (DALYs), mostly in developing countries[1], which are attributed to contaminated water and inadequate sanitation (WHO, 2005). There are several undertakings at the international level to change this situation.

The World Health Organization (WHO) and the International Water Association (IWA) are promoting the use of a comprehensive drinking water risks management approach, commonly referred to as water safety plans (WSPs). Water utilities have traditionally focused on 'end of pipe' testing for ensuring compliance with water safety standards (Helmer et al., 1999). Inadequacies in this approach, exposed through the outbreak of water borne diseases in affluent nations, led to the development of WSPs (see section 2.1). Instead of concentrating on 'end of pipe', the WSP approach encompasses all stages of water supply from the catchment to the consumer. The primary objectives of a WSP are to: prevent or minimize contamination of source waters; reduce or remove contamination through treatment processes; and prevent contamination during storage, distribution, and handling of drinking water (Davison et al, 2005).

Many water utilities in developed countries have adopted WSPs in continuing to safeguard, improve, and ensure the integrity of the water they supply. In most developing countries, service levels and quality, extent of expertise, and poor or lack of

[1] The World Bank (2008) considers developing countries to be those which according to 2007 Gross National Income (GNI) per capita had an income of $11,455 or less as. These countries are divided into low income, $935 or less; lower middle income, $936 - $3,705; and upper middle income, $3,706 - $11,455.

risk management systems, are among the reasons preventing delivery of good safe drinking water.

The 3rd edition of the WHO's Guidelines for Drinking-Water Quality (WHO, 2004) and the IWA's Bonn Charter for Safe Drinking Water (IWA, 2004) endorse the use of WSPs. The WHO and the IWA have put into place several programmes and activities geared towards promoting and supporting the adoption of WSPs among water utilities in developing countries. Examples of these activities and programmes include research, workshops, and creation of technical and managerial tools to enable knowledge transfer between water utilities in developing and developed nations. The IWA engaged Cranfield University to study the impact of culture on WSPs. As a result of this cooperation two doctoral studies were commissioned. The first study targeted organizational culture, while this study focused on the interface between local culture and organizational culture particularly in developing countries.

1.2 Research Aim and Objectives

The aim of this research is to elucidate cultural elements that can influence the development of WSPs in developing countries. This aim will be achieved through:

- identifying cultural factors that have affected WSP projects in developing countries;
- evaluating constraints to the transfer of WSP knowledge; and
- developing a culturally adapted good-practice framework of risk-management in relation to water safety.

1.3 Justification for the Research

The impact of national culture on an individual's beliefs, perceptions and behaviours has been established by various researchers (e.g. Leung et al, 2005). The influence that national culture has on managerial thoughts and activities has also been demonstrated by several scholars (e.g. Hofstede, 1980; Schneider, 1989; House et al 2004). Helmreich and Merrit (2001) point to a link between safety at the organizational level

and national culture. Effective safety measures require a clear comprehension of the influence that national culture has at the organizational level (Helmreich, 2000).

Culture is considered to be one of the main factors in explaining why many development projects have not attained their intended outcomes in less developed countries (Rondinelli, 1976; Pant et al 1996). The importance of considering culture in development projects is generally agreed upon by both practitioners and scholars. "*Nowhere does knowledge of another country's culturally determined norms and values play so decisive a role as in development cooperation*" (GTZ, 2007). It is necessary to incorporate culture into all development policies and place culture at the heart of such policies (UNESCO, 2007). The failure or non-sustainability of several development projects have been attributed to lack of cultural consideration (Schech and Haggis, 2000). Zomorrodian (1987) argues for the need to consider culture in project management.

For WSPs to be effective in developing countries, the impact of local cultures needs to be considered. The WHO specifies the favourability of considering its Guidelines for Drinking-Water Quality *"in the context of local or national environmental, social, economic and cultural conditions"* and the need for appropriateness to cultural circumstances (WHO, 2004). The Bonn Charter indicates the need for sufficient flexibility to take into account the cultural and socio – economic situations of different countries (IWA, 2004).

The need for considering culture is further heightened by the cross-cultural exchange of personnel, resources, information, and co-operation between countries and among organisations in the promotion of WSPs. In addition, the sustainable implementation of the technical and managerial tools used in or designed for developed countries will require adjustments to the local cultures of developing countries.

In spite of the recognition for the need to consider culture, the challenge of cultural influence in this area is further compounded by the scarcity of researched material. To my knowledge this is the first multi-country study aimed at elucidating how culture

affects the implementation of water safety plans in developing countries. Consideration of cultural factors increases the likelihood of WSPs being successful and sustainable in developing countries.

1.4 Approach and Methodology

This study adopts an interpretive and critical science stance. The case study approach, comprising of three field case studies conducted in India, Uganda, and Jamaica, is used. This research is an inductive inquiry aiming at theory generation and not hypothesis testing, nonetheless it is also informed by and built upon established theories in guiding its different phases. Given the aims of this research, this study is qualitative in both its design and data type.

1.5 Structure of the Thesis

Chapter 2 identifies and reviews theoretical and methodological dimensions in the literature.

Chapter 3 presents the methodology adopted in this study. In addition to positioning the study, in this chapter the inquiry paradigms are explained and both the theoretical and conceptual frameworks are presented

Chapter 4 describes the research method. This chapter explains the design of the case study and discusses the activities undertaken in preparation for data collection. The chapter also gives details on the collection and analysis of the data and highlights the evolution of the methodology.

Chapters 5, 6, and 7 present the findings from each of the three cases. Each chapter presents thematically arranged thick description of the cases. Interpretations of the findings are kept to a minimum to avoid repetitions in the discussion.

Chapter 8 discusses the findings in relation to the pertinent literature. A framework for addressing the impact of culture on the implementation of WSPs is also proposed in this chapter.

Chapter 9 summarises the overall findings and presents recommendations. Afterwards, the chapter states the contributions made to both theory and the practical implementation of WSPs in developing countries. The penultimate section of the chapter covers limitations of the research and finally areas for further research are identified.

1.6 Definitions

Culture: learned dynamic patterns of social behaviour and attitudes based on underlying values and beliefs used by a group of people as a guide to interaction among themselves, with others, and with the world around them.

Promoters: organizations that encourage and support the implementation of WSPs

Implementers: urban water utilities which can either be government owned, semi-private, or private

Customers: individual water utility clients who have access to piped water systems

1.7 Conclusion

This chapter introduced the thesis. It presented the research background and identified the problem being investigated along with the aim and objectives. Then the research was justified and the methodology was briefly described. In addition, the structure of the thesis was outlined and definitions provided.

2 LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of key concepts that are central to this study. After positioning the study, the chapter offers an overview of risk management in the water sector covering water safety plans, their implementation in developing countries, and their up scaling. Afterwards, the concept of culture is reviewed looking at its meaning, components, and other aspects such as its change. Towards the end of the chapter, is a review of what knowledge management entails, and its links to culture and water safety plans.

2.2 Positioning the Study

This research is situated in the fields of culture and management studies (Table 2-1). Within culture studies, aspects of both organizational and local cultures are reviewed.

Table 2-1: Research Field and Schools of Reference

Field of Research
• Culture Studies
• Organizational Culture
• Local Culture
• Management Studies
• Organizational Culture
• Cross-Cultural Management
• Risk Management
• Knowledge Management
Schools of Reference
• Sociology
• Psychology
• Anthropology
• Management

Areas such as organizational culture, risk management and knowledge management within management studies are also reviewed. The relationship between culture and management is examined within the general context of managing water utilities in

developing countries. The focal point of the study, on the culture side, is the interplay between local and organizational culture, and on the management side, the focus is on risk management. As such, this study investigates how the interplay between local and organizational culture impacts on managing drinking water risks. It is beyond the scope of this study to paint a complete picture of these broad fields of study, however, as warranted, I will elaborate on the relevant aspects in the following sections.

2.3 Risk Management in the Water Sector

Risk management is broadly defined as a systematic process of identifying, analysing and responding to risk (JISC, 2008). Standards Australia considers risk management as "the culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects" (Dalgleish and Cooper, 2005). Risk management is also seen as the process of making decisions under uncertainty (Hrudey et al, 2006).

Compared to other process industries, the explicit and routine use of risk identification, analysis, and management techniques has historically been less widespread in the water sector (Pollard et al, 2004). Water and waste water utilities are experiencing growing risks associated with increase in regulations and operational risks linked with either maintaining existing infrastructure or expanding capacity (Dalgleish and Cooper, 2005). The sector is being transformed by privatization, sector globalization, increased competition, emerging technologies, increasingly stringent regulatory control and the trend towards financial self-sufficiency: all of which are posing new risks and opportunities (Pollard et al, 2004).

These developments have led to the promotion of a business-wide approach to risk management as a means to ease and exploit this transition (MacGillivray et al, 2006). Risk management is applied to at least one of the following categories of risk: financial risk, commercial risk, public health risk, environmental risk, reputation risk, and compliance/legal risk (Pollard et al, 2004). However, there is the potential danger of viewing the principle goal of assuring public health protection through safe drinking water as being equivalent to the other priorities in the organisation (Hrudey et al 2006).

Nonetheless, the delivery of safe water must be a core value guiding risk management in the drinking water business (Hrudey et al, 2006).

Water utilities have traditionally focused on compliance with 'end of pipe' standards in the management of water safety (Helmer et al., 1999). The outbreak of water borne diseases in developed countries raised questions as to the effectiveness of drinking-water safety procedures and practices such as end of pipe testing. Events such as the Walkerton tragedy in which contamination of the water supply in a small Canadian community led to illnesses and loss of life necessitated the re-evaluation of water quality management practices. Deficiencies in the used approaches, such as the timeliness of below standards detection, led to the adoption of Hazard Analysis and Critical Control Points (HACCP), a preventative risk management approach used in the food industry.

The adoption of HACCP principles along with the use of other traditional risk management tools such as the multiple barrier approach and sanitary inspection led to the development of WSPs (Godfrey, et al 2005). Also incorporated into WSPs are other approaches such as ISO 9000 and total quality management (TQM) (Godfrey and Howard, 2004). WSPs came to the fore only after 2004 when the approach was included in the 3rd edition of the WHO's Guidelines for Drinking-water Quality (GDWQ).

2.3.1 Water Safety Plans

A Water Safety Plan (WSP) is an approach for consistently ensuring the safety of drinking-water supply through the use of comprehensive risk management procedures that encompass all stages of water supply from the catchment to the consumer (WHO, 2004). This holistic, systematic, and integrated approach is used to identify and prioritize potential risks to a specific water supply chain and implement best practices to mitigate those threats (CDC, 2009).

The aim of a WSP is "To consistently ensure the safety and acceptability of a drinking water supply" (Barttram et al 2009). The primary objectives of a WSP are to: prevent or minimize contamination of source waters; reduce or remove contamination through

treatment processes; and prevent contamination during storage, distribution, and handling of drinking water (WHO, 2011). While WSPs can vary in complexity and their use can encompass all water supply systems ranging from self supply systems to fully fledged water utility supply systems, its application will be looked at within the context of water utilities.

As shown in Figure 2-1 WSPs are a vital component of the WHO's framework for safe drinking water. This figure shows WSPs as having three main elements: system assessment, monitoring, and management and communication plans. These elements are steered by health based targets and overseen through the surveillance of the drinking-water supply. System assessment is used to determine the capacity of the whole water supply chain to deliver water that meets the identified targets and to also assess the design criteria for new systems.

During monitoring, measures that will collectively control determined risks and ensure achievement of health based targets are identified. The identified monitoring mechanisms ensure the timely detection of any performance deviation. Management and communication plans are used to describe the actions to be taken in both normal and incident conditions. This process also includes documenting system assessment including upgrade and improvement planning, monitoring and communication plans and supporting programmes (Davison et al, 2005).

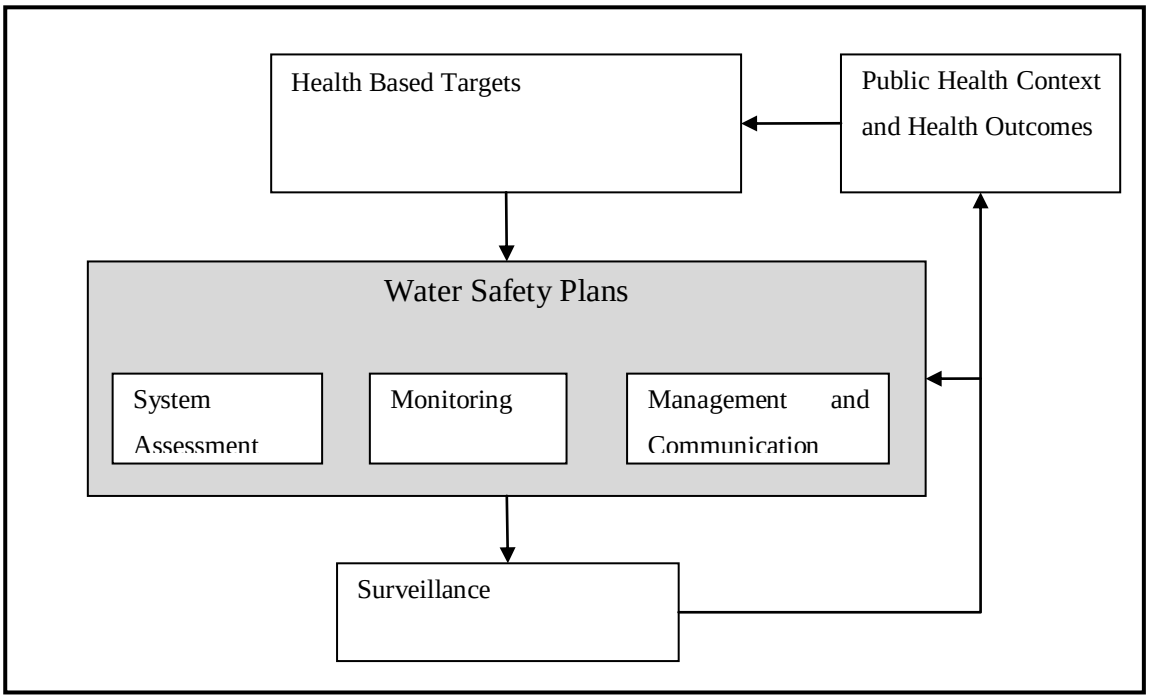

Figure 2-1: Framework for Safe Drinking Water (WHO, 2011)

The WSP process has been broken down into several steps for ease of implementation. For example, Bartram et al (2009) suggest an eleven step WSP implementation process; these steps and the main activities undertaken are summarised in Table 2-2. The first step is assembling of the WSP team which involves engagement of senior management team and securing of financial support. After the completion of steps two to nine, periodic reviews of the WSP is carried out to keep the plan up to date. Step eleven entails reviewing the WSP following the occurrence of an incident, emergency or near miss.

Table 2-2: The WSP Process (Bartram et al, 2009)

Step 1: Assemble the WSP Team
engage senior management, and secure financial and resource support identify the required expertise and appropriate size of the team appoint a team leader define and record the roles and responsibilities of the individuals on the team define the timeframe to develop the WSP
Step 2: Describe the water supply system
A detailed description of the water supply system including: relevant water quality standards; the source(s) of water including the runoff and/or recharge processes, and if applicable, alternative sources in case of incident; known or suspected changes in source water quality relating to weather or other conditions;

any interconnectivity of sources and conditions; details of the land use in the catchment; the abstraction point; information relating to the storage of water; information relating to the treatment of the water, including the processes and chemicals or materials that are added to the water; details of how the water is distributed including network, storage and tankers; description of the materials in contact with water; identification of the users and uses of the water; availability of trained staff; and how well existing procedures are documented.
Step 3: Identify hazards and hazardous events and assess the risks
Step 4: Determine and validate control measures, reassess and prioritize risks
identify the controls validate the effectiveness of the controls reassess risks, taking into account the effectiveness of controls prioritize all the identified risks
Step 5: Develop, implement and maintain an improvement/upgrade plan
draw up an improvement/upgrade plan implement the improvement/upgrade plan
Step 6: Define monitoring of the control measures
The number and type of control measures will vary for each system and will be determined by the type and frequency of hazards and hazardous events associated with the system. Effective monitoring relies on establishing: what will be monitored; how it will be monitored; the timing or frequency of monitoring; where it will be monitored; who will do the monitoring; who will do the analysis; and who receives the results for action?
Step 7: Verify the effectiveness of the WSP
compliance monitoring internal and external auditing of operational activities consumer satisfaction
Step 8: Prepare management procedures
Documentation of all aspects of the WSP including: actions to be taken during normal operational conditions, and detail steps to follow in specific 'incident' situations where a loss of control of the system may occur; ensuring procedures are kept up to date and in place to keep operators and management staff connected and involved, to make it easy for people to 'do the right thing', to provide adequate resources and to ensure that people are willing to come forward instead of withholding information for fear of reprisals; an efficient, regular review and updating cycle;

development of corrective actions which identify the specific operational response required following deviations from the set limits; generic emergency for unforeseen events/incidents or deviations for which there are no corrective actions in place; assessment of near misses; and investigation following an emergency which involves all staff to discuss performance, asses if current procedures are adequate, and address any issues or concerns.
Step 9: Develop supporting programmes
identify the supporting programmes needed for implementing the WSP approach; review, and as necessary, revise existing supporting programmes; and develop additional supporting programmes to address gaps in staff knowledge or skills that may impede the timely implementation of the WSP.
Step 10: Plan and carry out periodic review of the WSP
Keep the WSP up to date through regular reviews and revisions; this requires convening regular WSP review meetings. A WSP can quickly become out of date through: catchment, treatment and distribution changes and improvement programmes, which can impact on process diagrams and risk assessments; revised procedures; staff changes; and stakeholder contact changes.
step 11: Review the WSP following an incident
review the WSP following an incident, emergency or near miss; determine the cause of the incident, emergency or near miss and sufficiency of the response; and revise the WSP as necessary, including updates to supporting programmes.

Despite requiring certain minimum standards in terms of the above steps, the GDWQ emphasises the need for flexibility indicating that the process "should rely on the water supplier's existing practices and fit the way that a supplier is organized" (WHO, 2011). The process should not be seen as an alternative to already existing programmes but rather as a supportive mechanism aimed at enhancing these programmes.

While it may not be possible to fully establish a WSP all at once, undertaking steps such as system mapping, hazard identification, and risks assessment "will provide a framework for prioritizing actions and will identify the requirements for continuing improvement as resources become available" (WHO, 2011). In essence the process should initially be geared towards ensuring the optimal functioning of the existing system. In cases where the water supplier does not manage the catchment, WSPs play an important role in identifying existing and potential hazards and risks. While

remediation of some hazards, such as those in the catchment, may take time, this should not be a reason to delay the start and implementation of the WSP process (WHO, 2011).

Utilities might face several practical challenges in the initiation, development and implementation of a WSP. Some of the challenges identified by the WHO (2011) include:

- mistaken perceptions that one prescribed methodology must be followed;
- that WSP steps must be undertaken with risks managed from source to tap in a defined order;
- that developing a WSP always requires external expertise;
- that WSPs supersede, rather than build on, existing good practices; and
- those WSPs are necessarily complicated and are not appropriate for small supplies.

Notwithstanding these challenges, the implementation of WSPs can be of various benefits to water suppliers; this approach is flexible and serves to (CDC, 2012):

- identify opportunities for low-cost improvements to operations and management practices that can enhance water safety;
- improve efficiency and reduce expenses;
- improve stakeholders' understanding of the complete water supply chain and its vulnerabilities;
- improve communication and collaboration between key stakeholder groups, such as water providers, consumers, regulatory authorities and commercial, environmental and health sectors; and
- help substantiate and prioritize capital improvement needs and help leverage financial support.

In addition to above benefits, the implementation of WSPs also improves compliance, shows 'due diligence' and can lead to quicker response to incidents and improvement of existing staff knowledge (WHO, 2011). Compared to the previous reactive and retrospective water testing and disease surveillance systems, WSPs are considered to be

a reliable preventative risk management approach in protecting public health (Byleveld et al, 2008).

2.3.2 Water Safety Plans in Developing Countries

The implementation of WSPs in developing countries is mostly at the pilot or introductory stages. Godfrey and Howard (2004) indicate "crisis management", the norm in many water utilities in developing countries, is one of the main reasons for the lack of wide application of WSPs despite its assurance for better water quality and support for more effective asset management. However, as understanding of WSPs continues to increase, many developing countries are adopting this approach. For example, in addition to the three WSPs studied for this research (i.e. Hyderabad, Kampala, and Spanish Town) several other countries have implemented WSPs. Table 2-3 shows some of the places where these initiatives have taken place.

Table 2-3: WSP Initiatives in Developing Countries

Location	Period	Implementer	Main Promoter	References
Tarija, Bolivia	2006-2007	Tarija Water and Sewer Cooperative (COSAALT)	WHO/PAHO	http://www.cdc.gov/nceh/ehs/gwash/wsp.htm
South Africa	2004-2005	Rand Water	Rand Water	http://www.wrc.org.za/News/Pages/Water%20Safety%20Plans.aspx
Choma, Zambia	2010-2011	Southern Water and Sewerage Company Limited	Southern Water And Sewerage Company Limited	http://www.worldwaterweek.org/documents/WWW_PDF/2010/thursday/T4/Wallace_Shawa-Sweden_Presentation.pdf
Guntur, India	2002	Local Authority	DFID	Godfrey and Howard, 2004
Linden Guyana	2007-2008	Guyana Water Inc.	WHO & CDC	http://www.cdc.gov/nceh/ehs/Docs/Factsheets/GWASH_WSP_Fact_Sheet.pdf

Other than WHO, several other international organizations are involved in the promotion of WSPs. One such example is the IWA which through its 'Bonn Charter for Safe Drinking Water' (IWA, 2004) promotes the use of WSPs in achieving the goal of

"*good safe drinking water that has the trust of consumers*". Other key players in the promotion of WSPs include USEPA, CDC, and university institutions. Through the efforts of these organizations and local initiatives by governments and water utilities, WSPs are being implemented in almost all regions of the world. Some countries such as Iceland have gone a step further and have legislated the use of WSPs while others intend to do so.

Godfrey and Howard (2004) identify several aspects which influence the development and implementation of WSPs in developing countries:

- "Limited data availability – Many systems in the developing world are only recently developing the culture of data collection and storage";
- "Unplanned development – Limited regulation has resulted in unplanned development making it difficult to locate all supply mains";
- "Sanitation – Poor access to urban sanitation mean potential cross contamination of water pipes is common";
- "System knowledge – Much of the information on the piped networks may not be available as records may have been removed by contractors, colonial powers" and
- "Equipment/human resource availability - Selection of appropriate water quality parameters should consider availability of resources".

2.4 Water Safety Plans beyond Piloting

As explained earlier, WSPs in developing countries are mostly at the pilot stage and as such their wide scale implementation beyond piloting will require the adoption of scaling up strategies. In light of this, a review of this strategy along with its use in the implementation of WSPs is thus discussed.

2.4.1 The Concept of Scaling Up

The increasing importance of scaling up is linked to a shared concern among development practitioners on the pace towards achieving the MDGs. The concept of scaling up has been described as "elusive" (Picciotto, 2007) and researchers point out

that its debate "can be confusing" (Hartman and Linn, 2008). The term "scaling up" is widely used in the different sectors of the development arena. "In spite of, or perhaps because of, the wide use of the term, there is no consensus on the concept's precise definition and meaning among the different people who use it" (Simmons et al, 2007).

Hancock (2003) found out that scaling up and related terms such as scaling out and going to scale were sometimes used in reference to the replication, spreading, or adapting of systems, policies, and process. They consider this usage to be linked to the process as a means. They also point to its usage in reference to processes that can be considered as ends in themselves such as increasing the scale of socioeconomic, human, environmental, or other impacts.

Based on a review of definitions, Picciotto (2007) indicates a suggestion of a multidimensional meaning which not only points towards climbing up, but also reaching out and drilling down as in the growth of a tree in which branches spread and roots deepen. Below is a sample of various definitions used in different fields:

- "expanding, adapting and sustaining successful policies, programs or projects in different places and over time to reach a greater number of people." (World Bank, 2005)
- "To efficiently increase the socioeconomic impact from a small to a large scale of coverage" (Hancock, 2003)
- "process by which efforts to raise the incomes of the poorest citizens are extended in coverage along multiple dimensions—over time and geography, both within and across countries. (Desai, 2007)
- "the effort to magnify the impact of health service innovations successfully tested in pilot or experimental projects, so as to benefit more people and to foster policy and programme development on a lasting basis." (Simmons et al, 2007)
- "an intervention achieving coverage sufficient to have the desired impact" (Gillespie et al, 2007)

Despite their variations, all these definitions point towards an increment in provision.

2.4.2 Scaling Up Typologies

There are several classifications of scaling up processes. Amidst all the typologies, Cooley and Kohl (2005) mention five main vectors along which the scaling up of a pilot can occur:

- Geographic coverage, i.e. extension to new locations;
- Breadth of coverage, i.e. extending number of people being served in current categories and localities;
- Depth of services, i.e. providing additional services to current clients;
- Client type, i.e. extending to new categories of clients; and
- Problem definition i.e. extending current methods to new problems

The literature on scaling up is somewhat confusing when it comes to its use of terms such as 'approach', 'type' 'path' and 'method'. For example, there are instances where 'approach' is used to mean attitudes towards the process and instances where it is used to mean the type of the process.

Table 2-4: Scaling Up Typology (Van Oudenhoven and Wazir, 1989)

Approach	Paths
Universalist -Supply determined -Based on widely applicable universal beliefs -Calls for adherence to standards and principles	Franchise Approach Also known as 'cookie cutter' approach Assumes the process can be replicated Components and performance standards largely inviolable Mandated Replication Usually sponsored by government Always top down No element of choice involved Staged Replication Most structured Takes place in three stages i.e. pilot, demonstration and replication Need for an independent replicating agency is stressed
Contexualist -Need based -Recognizes the uniqueness of each particular setting -Precludes wholesale cloning -Acknowledges validity of local knowledge -Non-hierarchical exchange	Concept Replication Focus on general principles and components Strict adherence to the strategies and prototype model not required Success measured in terms of adaptation and sensitivity to local context Spontaneous or Endogenous Replication Demand for information comes from below Characterized by spontaneous and informal contacts between like-minded individuals Two way flow of information

In reference to views on scaling up, Van Oudenhoven and Wazir (1998) suggest two scaling up approaches: a universalist and a contexualist approach. Under these approaches they distinguish five different paths to scaling up. Table 2-4 summarises their categorizations. Notwithstanding the distinctions, different features of the above listed approaches are normally combined together in practice.

Uvin (1995) identifies four types of scaling up which also often go together but are not identical: quantitative, functional, political and organizational scaling up. While qualitative scaling up focuses on expansion in size, functional scaling up is geared towards expansion in activities.

Table 2-5: Uvin's Scaling Up Typologies

Type	Paths and Features
Quantitative	Spread: increasing numbers of people spontaneously adhere to the organization and its programs, perceiving them to serve their interest/preferences Replication: a successful program (methodology and mode of organization) is repeated elsewhere Nurture: a well-staffed and well-funded outside agency, using a specific incentive-based methodology, nurtures local initiatives on an increasingly large scale Integration: a program is integrated into existing structures and systems and in particular government structures after it has demonstrated its potential
Functional	Horizontal integration: unrelated new activities are added to existing programs, or new programs are undertaken by the same organization Vertical integration: other activities related to the same chain of activities as the original one are added to an existing program
Political	Information and mobilization: an organization's members or local communities are stimulated to participate in the body politic Aggregation: federative structures designed to influence policy making are created Direct entry into politics: grassroots organizations, or their leaders, either create a political party or join an existing one
Organizational	Diversification of donors Increase the degree of self-financing, through subcontracting, consultancy. or fees-for-service Create institutional variety, both internally and externally

Political scaling up involves moving beyond service provision towards empowerment and changing of structural causes of underdevelopment. Organizational scaling up

involves improving of organisational capacity in areas such as finance and management capacity. As shown in Table 2-5, each of these types follows different paths.

Hancock (2003) mentions two approaches to effecting changes, organizational growth and institutional and policy change. Organizational growth (or "horizontal") approaches primarily focus on coverage extension of direct service delivery to target population groups. Successful systems are expanded or implemented elsewhere relatively unchanged. This approach is roughly equivalent to Uvin and Miller's (1994) quantitative and organisational scaling up. Institutional and policy change (or "vertical") approaches involves the use of successful experiences as the basis for policy and/or institutional changes. The changes are then used to shape service delivery. This approach is roughly equated to Uvin and Miller's (1994) functional and political scaling up.

Institutional approaches for scaling up development interventions can be grouped into hierarchical, individualistic, and relational approaches (Granovetter and Swedberg 1992; Picciotto, 2007; Hartman and Linn, 2008). The hierarchical approach stresses the values of charismatic leadership and normally includes top-down, planned programs. The individualistic approach views society as being made up of individuals motivated by self-interest. This conception stresses the creation of right incentives and accountability for individuals. This approach identifies collective action dilemmas, information asymmetries and agency problems as possible obstacles to effective scaling up.

Although proponents of the individualistic approach (e.g. Easterly, 2006; Schaffer and Ashkenas 2005) have argued against top-down, large scale interventions and have made a case for considering risks involved in such interventions and the need for taking incentives and accountability into account, Hartman and Linn (2008) point out that they "do not effectively address the need for collective action when development programs are taken to scale." This, they counter argue, "often requires a long term perspective, large-scale and centralized organization and some top-down decision making and implementation".

The relational approach views society as a set of networks embedded in social links and informal groupings. This view relies on decentralization, participatory methods and empowerment techniques and has gained wide acceptance among development practitioners and researchers in recent years. This approach has fostered a "belief that effective development requires a fundamental shift in perception" where project beneficiaries are no longer portrayed as passive recipients but as active participants (Hartman and Linn, 2008).

Table 2-6: Cooley and Kohl's Scaling up Typology

Type	How
Expansion Taking a model to scale by increasing the scope of operations of then organization that originally developed and piloted it.	Growth-normally occurs by branching out into new locations Restructuring or Decentralization-organizational changes Franchising-model franchised to clone organizations or operating agents Spin-Off-parts of the originating organization operate independently
Replication Increasing the use of a particular process, technology, or model of service delivery by getting others, including the public sector, to take up and implement the model	Policy Adoption-model is scaled up from a pilot run by an NGO to a program or practice mandated and often run by the public sector Grafting- A model or a component of a model is incorporated into another organization's array of services or methods of service delivery. Diffusion and Spillover-tend to be spontaneous in nature and occur when a model spreads by informal networking with new or existing organizations or through the use of more deliberate dissemination efforts. Mass Media-a special case of diffusion that bypasses organizations altogether by marketing new ideas directly to the affected public
Collaboration Falls somewhere between the expansion and replication approaches. Runs the gamut from formal partnerships to informal networks and include a number of innovative structures and governance arrangements.	Formal Partnerships, Joint Ventures, and Strategic Alliances-Less formal, based on memoranda of understanding or merely a handshake. Typically, these arrangements include some division of responsibility among the collaborating organizations. Networks and Coalitions-More formal collaborative efforts applying same methods as partnerships ventures and alliances.

Finally on typologies, Cooley and Kohl (2005) classify scaling up into expansion, replication and collaboration processes. Each of these processes, as shown in Table 2-6, uses different methods to achieve the objective. Again, some of these methods can be used together. For example, policy adoption and grafting can be combined when a public sector agency incorporates a technique innovated by NGOs into its services.

2.4.3 Creating Successful Scale Ups

Simmons et al (2007) mention seven characteristics that facilitate innovation transfer. They point out that innovations must be:

- credible, based on sound evidence or espoused by respected persons or institutions;
- observable, to ensure that potential users can see the results;
- relevant, for addressing persistent or sharply felt problems;
- have a relative advantage over existing practices;
- easy to install and understand;
- compatible with the potential users' established values, norms and facilities and
- testable without committing the potential user to complete adoption.

Table 2-7: Steps and Tasks in Scaling Up (Cooley and Kohl, 2006)

Step 1: Develop Scaling up plan
Task 1: Create a vision
Task 2: Assess scalability
Task 3: Fill information gaps
Task 4: Prepare scaling up plan
Step 2: Establish preconditions for scaling up
Task 5: Legitimize change
Task 6: Build a constituency
Task 7: Realign and mobilize resources
Step 3: Implement the scaling up process
Task 8: Modify and strengthen organizations
Task 9: Coordinate Action
Task 10: Track performance and maintaining momentum

Desai (2007) identifies resource mobilization, program proliferation, political bargaining, and institutional reform as important components of scaling up. As seen in Table 2-7, Cooley and Kohl (2006) have developed a comprehensive list of steps to be followed and particular tasks to be carried out during each step of scaling up. This approach stresses the importance of good planning. While the sequence of carrying out

particular tasks may vary, it is generally advisable to follow the main steps in their laid out sequence of planning, establishing preconditions and implementation.

2.5 Conceptualising Culture

2.5.1 What is Culture?

Explaining the concept of culture is generally thought to be a challenging task (Schmid, 1992). One of the challenges faced in studying culture emanates from the multiplicity of meanings of the concept and its associated vagueness which makes it "an entity difficult to treat as a *variable*, either dependent or independent" (Smelser, 1992). "At one time or another, myths, values, eating and dressing habits, scientific theories, social norms, novels, and situational definitions have all been treated as elements of culture" (Mayntz, 1992).

The word culture is considered to be among the top three most complex words in the English language (Eagleton, 2000). Owing to its complexity, culture has been variously defined. Etymologically speaking, the word is said to have its roots in the Latin word *colere* whose meaning includes cultivating, inhabiting, worshiping and protecting. Eagleton (2000) ascribes the contemporary idea of culture mostly to nationalism and colonialism and the development of anthropology in the service of imperial power. In defining culture, the work of the 19th-century English anthropologist, Sir Edward Burnett Tylor, is considered to be a good influential starting point (Holden, 2002).

Tylor described culture as "... that complex whole which includes knowledge, belief, art, morals, laws, custom, and any other capabilities and habits acquired by man as a member of society" (Encyclopaedia Britannica, 2000).

The American anthropologists Kroeber and Kluckhohn (1952) indicate:

> "Culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievements of human groups, including their embodiment in artifacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be

considered as products of action, on the other, as conditional elements of future action."

Reflecting on the above explanation by Kroeber and Kluckhohn, Adler (1997) considers culture to be something which is:

- Shared by members of a social group;
- Passed to younger members of a group by older members; and
- Central to shaping behaviour and structuring one's perception of the world

Kroeber and Kluckhohn's definition is also seen to imply "...the existence of a larger 'culture' (or meta-culture) of the different cultures that make up one's society's culture" and a distinction between one's own society's culture and another society's culture (Dahl, 2004). Distinction between groups is also used by Hofstede (1991) in his description of culture as "the collective programming of the mind which distinguishes the member of one group or category of people from another". In stressing the fact that culture is learned, Hofstede describes culture as a collective phenomenon which is derived from one's social environment and not from one's genes. Although he makes a distinction between culture and human nature as shown in Figure 2-2, he cautions that "....exactly where the border lies between culture and personality, is a matter of discussion among social scientists."

Spencer-Oatey (2000) defines culture as: "...a fuzzy set of attitudes, beliefs, behavioural norms, and basic assumptions and values that are shared by a group of people, and that influence each member's behaviour and his/her interpretations of the "meaning" of other people's behaviour." Hall (1984) considers culture to be mostly subconscious. In his view, culture is like an unseen system in our minds which we become aware of only after difficult challenges such as being exposed to other cultures. According to Dahl (2004), 'culture' at a basic level "... has been used to describe the modus operandi of a group of people ..." and "... the shared values that underpin the modus operandi." He points out that "the concept describes both the underlying value as well as the behaviour that can be observed."

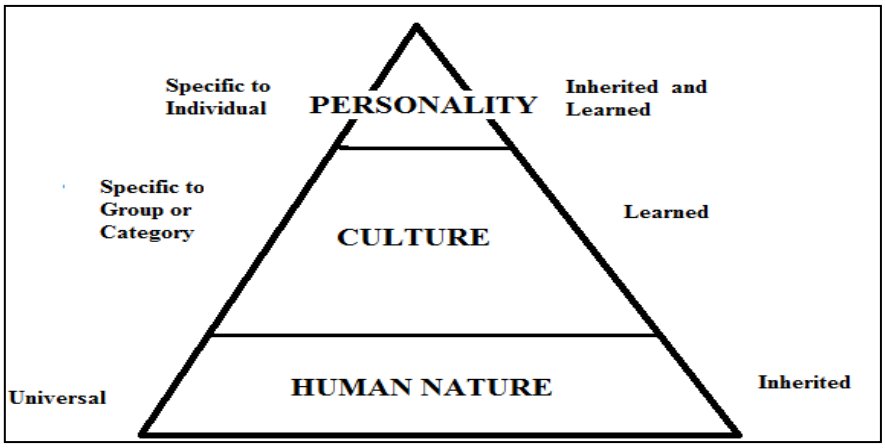

Figure 2-2: Three Levels of Uniqueness in Human Mental Programming (Hofstede, 1991)

In his assessment of definitions of culture, Brooks (2008) rightly points out that such definitions consist of cognitive, physical, and collective elements. Although definitions abound, I build on previous definitions and take Brooks (2008) assessment into account to construct the following definition that will guide this research: **Culture is the learned dynamic patterns of social behaviour and attitudes based on underlying values and beliefs used by a group of people as a guide to interaction among themselves, with others, and with the world around them**.

2.5.2 Components of Culture

In the literature on culture there are various presentations of the elements of culture as being layered and being comprised of aspects described as, internal or external, visible or invisible, or implicit and explicit. These models imply the need to dig beneath the surface in order to understand a particular culture or as Trompenaars & Hampden-Turner (1998) indicate "Culture comes in layers, like an onion. To understand it, you have to unpeel it layer by layer" In this section several of the layered models of culture will be explained.

Hall's Cultural Iceberg Model

Hall (1976) uses the analogy of an iceberg to describe aspects of culture that are visible above the water and a larger part invisible under the surface. The tip of the iceberg

comprises the visible parts of culture made up of behaviour and some beliefs. Underneath the surface are some beliefs, values, and thought patterns that underlie behaviour. According to this model the invisible aspects are difficult to change and require active participation in the culture to uncover.

Hofstede's Onion Model

Hofstede (1991) developed a four layered model which he compared to an onion. These four layers which can be peeled layer by layer are symbols, heroes, rituals and values at the heart (Figure 2-3). Among the many terms used to describe the visible manifestation of culture, Hofstede (2001) says "the following three, together with *values*, cover the concept rather neatly: *symbols*, *heroes* and *rituals*."

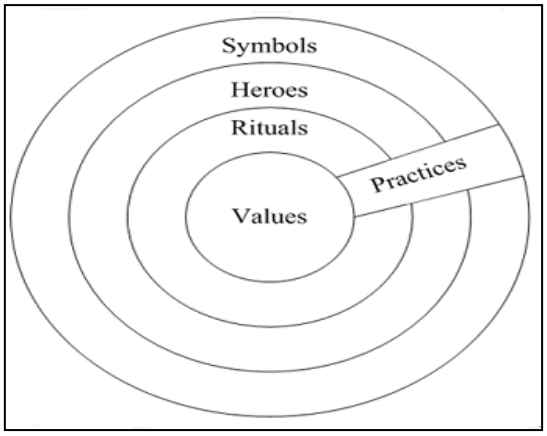

Figure 2-3: The "Onion Diagram" Manifestation of Culture at Different Levels of Depth (Hofstede, 2001)

At the core of Hofstede's onion are values. Values are described as "broad tendencies to prefer certain state of affairs over others" (Hofstede, 1991). Hofstede also describes values as having a plus and a minus side and dealing with issues such as: evil vs. good, dirty vs. clean, and ugly vs. beautiful. Values are not visible until they become evident in behaviour, their influence on behaviour is also emphasised. Symbols include words, gestures, pictures and objects that commonly carry complex meanings only known to the members of the culture. Also included among symbols are dress, hairstyle, flags, and status symbols. The placement of symbols in the outer most superficial layer is

indicative of their nature as being easily developable, copied by others and their disappearance (Hofstede, 2001).

Heroes are described as "persons, alive or dead, real or imaginary, who posses characteristics that are highly prized in a culture and thus serve as models for behaviour." (Hofstede, 2001) Heroes are not limited to persons and can include cartoons such as Batman. Rituals are explained as being "collective activities that are technically unnecessary to the achievement of desired ends, but that within a culture are considered socially essential, keeping the individual bound within the norms of the collectivity" (ibid). In this definition, the description of un-necessity is one which the author considers debateable because the necessity of the ritual depends on the practitioners. Examples of rituals include methods of greetings, and religious and social ceremonies. In the model 'practices' are shown as cutting across symbols, heroes and rituals. Implied in this model is that the three outer layers become manifest through practices.

Trompenaars's and Hampden-Turner's Onion Model

Trompenaars's & Hampden-Turner's (1998) model depicts culture as being made of three layers: outer, middle and core. The outer layer consists of explicit and observable aspects such as "language, food, buildings, houses, monuments, agriculture, shrines, markets, fashions and art." The outer layer is considered to be a manifestation of the cultural layers beneath it. The middle layer consists of norms and values. Norms present a groups' mutual sense of what is considered as right or wrong. Norms can be developed formally such as in written laws or informally through social control. Values are considered as being closely related to a group's shared ideals and as determinants of what is defined as good or bad. In practice, norms provide guidance on how to behave while values provide guidance on behavioural aspirations. The core layer constitutes assumptions about existence. In this layer the model contains basic values such as striving for survival and human equality. Cultural stability is affected by the synchronization between norms and values, "When this is not the case, there will most likely be a destabilising tension" (Trompenaars's & Hampden-Turner's, 1998).

Spencer-Otey's Onion Ring Model

Spencer-Oatey's (2000) onion ring model builds on the two previously described onion models by Hoftsede, and Trompenaars and Hampden-Turner. Her model (Figure 2-4) is comprised of three intact rings and a fourth split ring on the outside.

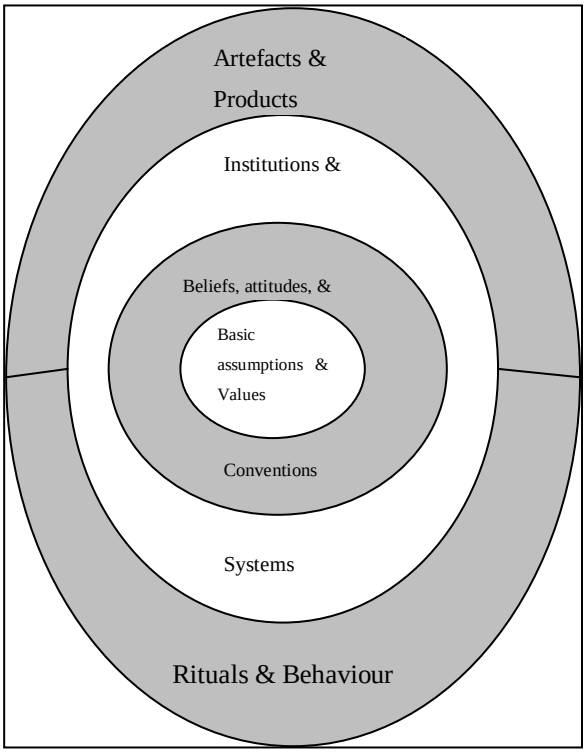

Figure 2-4: Spencer-Oatey's (2000) onion ring model

The innermost layer consists of basic assumptions and values. The layer after is made up of beliefs, attitudes, and conventions. The third layer comprises systems and institutions. The split outer layer consists of rituals and behaviour on one side and artefacts and products on the other side. This model is more elaborate than the two previous models in several ways. First, it combines basic assumptions and values in its core. Second, in the following layer it distinguishes beliefs from attitudes and conventions. Third, it acknowledges the influences of systems and institutions and places them on the third layer. Fourth, the inclusion and separation between rituals and behaviour, and artefacts and products in the fourth layer establishes the link and separation between human activity and materials.

2.5.3 Studying Culture

Background and Contested Areas

The study of culture has evolved in various ways since the 19th century. Many historians and social philosophers at that time had an "elitist conception" of culture in which culture was considered to be "a kind of idea, or spirit, or Geist" that was carried by the elite members of society" as articulated in the "evaluative connotations of cultured and uncultured" (Smelser, 1992). During the late 19th century the idea of culture was made more inclusive and viewed as being applicable to the whole society by influential scholars in anthropology.

The conceptualization of culture as a distinct and real ontological entity as opposed to its earlier consideration as an analytical construct marked a major shift (Eisenstadt, 1992). Parallel to this was a shift away from "the structural-functional emphasis on values and norms" to a broader approach encompassing various dimensions of culture and social structure (Eisenstadt, 1992). One of the emergent constructions considered culture to contain the "programmatic codes" of human behaviour. Included in such views is the idea of culture as being "embedded in the nature of the human mind", "programmed according to clear principles", and regulating human behaviour through "a series of codes" (Eisenstadt, 1992). Also part of this construction is the idea of culture as "a set of expressive symbols of ethos—a worldview constructed through active human interaction" espoused by symbolic anthropologists, such as Geertz, Turner, and Schneider (Eisenstadt, 1992). Another emergent construction considered culture to be "the result of the aggregation of individual preferences, reflecting differences of power or patterns of individual choices" (Eisenstadt, 1992).

The shift in the intellectual perception of culture during the late 19th century, explains Smelser (1992), led to a century old debate surrounding the issues of cultural coherence and its degree of sharedness. Arguments for cultural coherence by scholars such as Morgan and Engels are based on the developmental stages of society positing that a society's level of technology affected its "religion, family structure, stratification, and other customs and mores" (Smelser, 1992). Closely linked to the issue of coherence is the reproduction of culture in the individual and the social structure. Explanations

provided for individual level reproduction include those of Durkheim and Parsons (Smelser, 1992). Durkheim attributed the internalization of culture to institutions of education and pedagogy and linked its conformity to individual will. Parsons attributed the process as taking place through the family. Constructs for social level reproduction include Durkheim's "collective conscience" representing all that which is common in society and incorporating the notion of consensus through aspects such as language and rules. On the issue of sharedness scholars have debated on "whether and to what extent subsystems of society possess a culture of their own" (Mayntz, 1992). One of the accepted views is that "cultural differentiation is a correlate of social differentiation, and that it is hence meaningful to speak, for instance, of different regional, ethnic, class, and professional cultures within a given society" (Mayntz, 1992). Another position has been to view social subsystems "as societies *en miniature* and attempts have been made to identify the manifestations of the encompassing cultural system of the society at large in the smaller unit". Mayntz (1992) reconciles these two positions by indicating they are not mutually exclusive and explains "Subcultures may well have specific or even unique traits and manifest a wider societal culture at the same time". Eisenstadt (1992) indicates the shifts in the perception of culture "were accompanied by a preference for exclusive deterministic, reductionist, idealist, or materialist interpretations of social action and culture creativity" and connected them to dissociation between studies of culture and of social structure.

The relationship between culture and social structure has been problematic in the sociological analysis of culture (Eisenstadt, 1992). The analytical distinction between culture and social structure, advocated by Parson and Kroeber "excludes observable behavior patterns from the concept and characterizes culture as an idea system" (Mayntz, 1992). This position is in contrast to the view that treats culture and social structure as part of a sociacultural system in which the two are inextricably intertwined (Mayntz, 1992). The production, reproduction, and transformation of social structure, points out Münch (1992), are in interaction with the cultural code of a society entailing its values, norms, and language. "This interaction is where culture meets social structure, exerts its influence on it, and is itself influenced by it."

One area in which the culture-structure relationship has been challenging is the order-maintaining versus the order-transforming functions of culture (Eisenstadt, 1992). The different position in the field can be attributed to views on the "degree to which social structure determines culture or vice-versa" which are closely tied to views on the extent of reciprocal determination between social behaviour, culture and social structure. Eisenstadt associates the vision of culture as a reflection of society or its legitimizing mechanism to Marx and Durkheim and its modified form to Parsons. The idea of culture as order transforming indicates Eisenstadt, is embodied in Weber's work especially in his analysis of the world religions, particularly the Protestant ethic. Eisenstadt considers the order-maintaining and the order-transforming aspects of culture as being two sides of the same coin. He sees them as being integral pieces of the symbolic dimensions in the construction of social order.

Study Paths

Explaining the many avenues, styles, and emphases of investigating cultural phenomena Smelser (1992) points to the legitimacy and merit of scholarly pursuit of tackling the issue "as a social-scientific concept and variable, as a literary or narrative text, as a philosophical system, and as a way to evaluate the high or low attainments of a civilization". He stresses the need to regard each of these approaches "as independent from one another in many respects and not as competitors in the same explanatory or methodological race." Furthermore he cautions that "the investigator, as well as the conceptual apparatus he or she brings to the study, must be considered as an active factor—a source of variation—in understanding what a culture is and what its characteristics are."

The linguistic anthropologist Kenneth Pike (1954, cited in Lett, 1996) suggests two perspectives which can be used in cultural studies. Pike coined the terms emic and etic, which he derived from the terms 'phonemic' and 'phonetic', to respectively describe an insider's and an outsider's point of view. The emic perspective concentrates on intrinsic cultural variations that are meaningful to the members of a particular community while the etic perspective depends on extrinsic concepts and categories that make sense to the observer.

Where the etic approach is built on the assumption that cultures can be studied using a set of universal cultural dimensions that are relevant to all cultures, the emic approach assumes that some cultural dimensions are specific to particular cultures and as such cannot be applied in the analysis of various cultures (Taras et al, 2009). The integration of these approaches in studying culture is recommended by several researchers (e.g. Taras et al, 2009; Marris et al 1998 & Lett, 1996) indicating that such an integration can lead to true understanding of culture. The combination of these approaches is also considered to be a "best practice" that enables researchers to put aside their cultural biases (Schaffer & Riordan, 2003) In this study both approaches were combined. The emic approach was used to gain understanding of the different cultural settings of the study through qualitative methods explained in Chapter three. The etic approach was then used to compare observed similarities as shown in Chapter eight.

Describing the process of studying culture, Geertz, (1973) writes "Man is an animal suspended in webs of significance he himself has spun. I take culture to be those webs, and the analysis of it to be therefore not an experimental science in such of law but an interpretive one in such of meaning." We are all born into a particular culture, and in studying other cultures, it is imperative that we remain aware of our culture's influence on our perception. As Hofstede (1991) points out "When a person X makes a statement about a population or population group Y (his or her own or another) his statement always contains information about X, but whether it also contains valid information about Y remains to be proven."

Cultural Dimensions

Cultural dimensions have been used by researchers in comparing cultures. Social anthropologists of the first half of the twentieth century led in the development of cultural dimensions through "the conviction that all societies, modern or traditional, face the same basic problems; only the answers differ" (Hofstede, 1991) It is in the pursuit of the identification of these problems that in 1954 the two Americans, Sociologist Alex Inkeles and the Psychologist Daniel Levinson, suggested the issues listed below as qualifying to be "common basic problems worldwide, with consequences for the functioning of societies, of groups within those societies, and of individuals within those groups." (Hofstede, 1991):

- Relation to authority;
- Conception of self, in particular: the relationship between individual and society, and the individual's concept of masculinity and femininity;
- Ways of dealing with conflicts, including the control of aggression and the expression of feelings. (Inkeles and Levinson, 1969)

2.5.4 Levels of Culture

This study looks at culture form three different levels. As presented in Figure 2-5. The national culture is seen to contain the organizational culture which in turn contains safety culture.

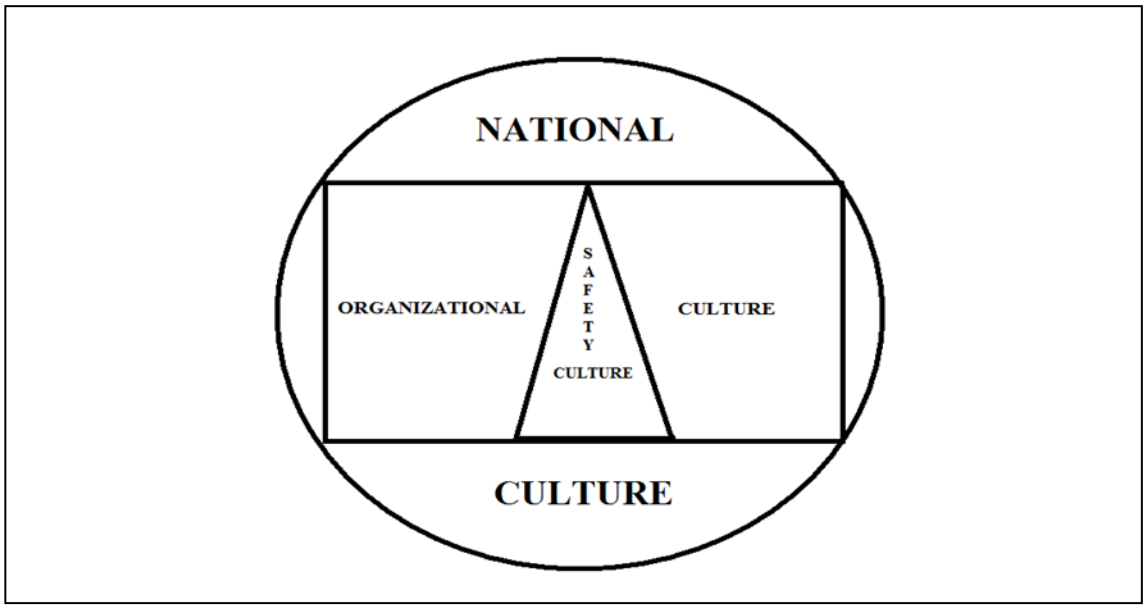

Figure 2-5: Levels of Culture

National culture is what is normally being referred to when discussions of culture are taking place. The idea of a national culture is related to the notion that a given population possesses certain collective characteristic. Organizational culture among its many definitions has been used to describe "the sum of perceptions that develop within an organization" (Mead, 1994). Safety culture, on the other hand, is " a sub-facet of organizational culture, which is thought to affect members' attitudes and behaviour in relation to an organization's ongoing health and safety performance" (Cooper, 2000).

2.5.5 Cultural Change

Hofstede (2001) asserts that "Cultures, especially national cultures, are extremely stable over time." This stability can at times be of concern to development workers especially when there is a desire to change certain aspects of a culture. Bartle (2007) suggests that cultural change can be viewed through the following six dimensions: technological, economic, political, institutional (social), aesthetic-value, and belief-conceptual. Figure 2-6 shows different stages of cultural change along these six dimensions.

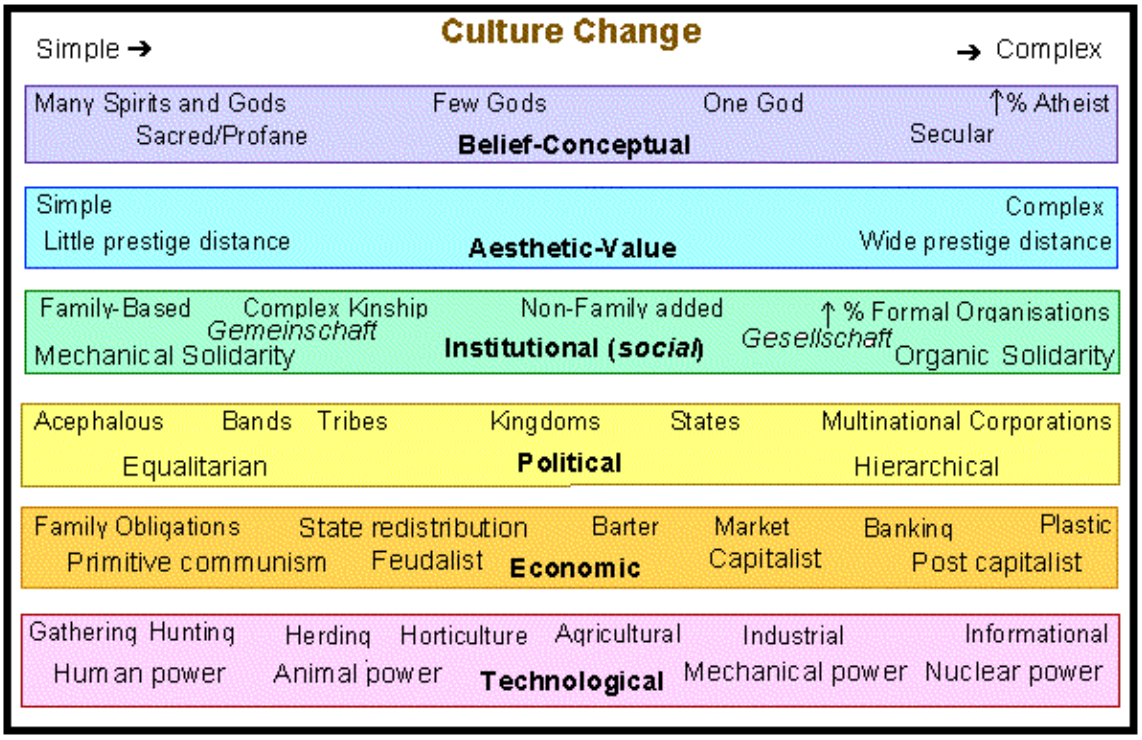

Figure 2-6: Dimensions of Culture and Cultural Change (Bartle, 2007)

Bartle (2007) defines technical dimension of culture as a culture's "tools and skills, and ways of dealing with the physical environment. It is the interface between humanity and nature." He stresses that it is not the physical tools that make up the culture, but rather "it is the learned ideas and behaviour which allows humans to invent them, use them, and teach others about tools" (ibid). From the aspect of development work, the introduction of new technology such as a new water system requires preparation and understanding of "the effects on other dimensions of culture by the introduction of a change in the technological dimension" (ibid).

The economic dimension of a culture includes the "various ways and means of production and allocation of scarce and useful goods and services (wealth), whether that is through gift giving, obligations, barter, market trade, or state allocations" (Bartle, 2007). A distinction is made between the physical items like cash and "the various ideas, values and behaviour which give value to cash" is made (ibid).

Bartle (2007) describes the political dimension of culture as the "various ways and means of allocating power and decision making." This is differentiated with ideology which is placed in the values dimensions. The political dimension "includes, but is not limited to types of governments and management systems." and "... how people in small bands make decisions when they do not have a recognized leader" (ibid).

"The social or institutional dimension of culture is composed of the ways people act, interact between each other, react, and expect each other to act and interact" (Bartle, 2007). This dimension includes institutions such as marriage, roles such as mother, status and other patterns of human behaviour. "The aesthetic-value dimension of culture is the structure of ideas, sometimes paradoxical, inconsistent, or contradictory, that people have about good and bad, about beautiful and ugly, and about right and wrong, which are the justifications that people cite to explain their actions" (Ibid).

"The belief-conceptual dimension of culture is another structure of ideas, also sometimes contradictory, that people have about the nature of the universe, the world around them, their role in it, cause and effect, and the nature of time, matter, and behaviour" (Bartle, 2007). When a change is introduced in a community, there is a definite need to consider each of these dimensions. When it comes to values and beliefs, added care has to be paid in not being offensive.

Bartle (2007) emphasizes the need to remain aware of the interconnections between the different cultural dimensions in undertaking development work. There might be a casual and functional interrelation between the dimensions and it must be kept in mind that making "changes in any one dimension has repercussions in each of the other dimensions" (ibid). For instance the introduction of a new water system will also require new institutions to maintain the system and perhaps changes in some values too. Bartle (2007) mentions that instilling change in one cultural dimension does not only

need changes in other dimensions, but will also cause changes in other dimensions. Because of this, he stresses the need for social impact assessment prior to all development projects of every kind and size.

2.5.6 Water and Culture

The relationship between water and culture is openly acknowledged as seen in the following quote from UNESCO's former Director General during a World Water Day celebration: "Water is probably the only natural resource to touch all aspects of human civilization - from agricultural and industrial development to the cultural and religious values embedded in society" (Matsuura, 2002). "Water is one of our enduring human symbols of life, regeneration, purity and hope. It is one of our potent links with the sacred, with nature, and with our cultural Inheritance" (Priscolli et al 2004).

One particular aspect of culture in which water is explicitly referred to is religion. Many religious scripture link water to the origins of life. In the bible the story of creation mentions water, "Now the earth was formless and empty, darkness was over the surface of the deep, and the Spirit of God was hovering over the waters" (Genesis 1:2). In the Quran the reference is more explicit "We made from water every living thing" (Prophets 21:30).

Almost all major religions use water for cleansing and blessing rituals. For example, in Christianity water is mostly linked to baptism. Jesus was baptised by John the Baptist in river Jordan (Matthew 3:12-14). Baptism symbolises a new beginning, rejection of sin and an admission into the church. The bible states:

Or don't you know that all of us who were baptized into Christ Jesus were baptized into his death? We were therefore buried with him through baptism into death in order that, just as Christ was raised from the dead through the glory of the Father, we too may live a new life (Romans 6:3). For if we have been united with him in a death like his, we will certainly also be united with him in a resurrection like his. (Romans 6:5)

Baptism is also linked to the story of Noah and the flood. The bible says:

¨ to those who were disobedient long ago when God waited patiently in the days of Noah while the ark was being built. In it only a few people, eight in all, were saved through water, and this water symbolizes baptism that now saves you also—not the removal of dirt from the body but the pledge of a clear conscience toward God. It saves

you by the resurrection of Jesus Christ, who has gone into heaven and is at God's right hand—with angels, authorities and powers in submission to him" (1 Peter 3:20-22)

The Ritualistic use of water in Christianity is preceded by its ritualistic use in Judaism. In the Jewish religion immersion is done in a *mikveh.* By immersing oneself in water, one becomes ritually pure. The Jewish religion specifies occasions when a *mikveh* is necessary, for example, after emission of semen, after a woman gives birth or after menstruation. Muslims also use water for ritual purification. Before engaging in prayer one has to perform *wudhu,* that is the minor ablution. On other occasions such as after sexual intercourse or monthly menses one has to perform *Ghusl,* a complete wash of the body. In addition to attaining ritual purity Muslims also believe that *wudhu* washes away their sins. This is explained in the frequently cited *Hadith,* the traditions of Prophet Muhammad:

The Prophet (peace be upon him) said: "When a Muslim worshipper performs wudû' and washes his face, then every sin that he incurred by what his eyes fell upon comes out from his face with the last drop of water. When he washes his hands, every sin that he incurred by way of his grasp comes out form his hands with the last drop of water. When he washes his feet, every sin that he incurred by way of his walking comes out from his feet with the last drop of water. Ultimately, he comes forth free of sin." (Sahîh al-Bukhârî -360)

Thus in Islam water not only readies the believers for worship, but it also literally washes away their sins as it does clean them physically. In Hinduism water is one of the five elements of nature and it is considered to have spiritually cleansing powers. Water in general and rivers in particular are considered to be holy. The most important of the seven sacred rivers is the Ganges, the others being Narmada, Godavari, Kaveri, Sindhu, Sarasvati, and Yamuna. Followers must engage in morning cleansing with water and also use water to clean themselves before going into the temple.

2.6 Knowledge Management

Knowledge management (KM) is crucial to WSPs. This section looks at what KM entails, its relationship with culture, and its centrality to the WSP process. The importance of KM to the water sector, as in other sectors, is indisputable. Risks and uncertainties facing the water sector necessitate the management of complex data,

information and knowledge (Mounce et al, 2010). This importance is elevated by the WSP process which has knowledge management at its core. First, the concept of knowledge and the process of KM are explained followed by an assessment of KM and culture, and KM and WSPs.

2.6.1 The Concept of Knowledge

Knowledge is justified true belief which gives an individual or an organization the capacity to take effective action (Nonaka, 1994; Bennet and Bennet, 2003).

Table 2-8: Knowledge Perspectives and their Implication (Alavi and Leidner, 2001)

Perspectives		Implications for Knowledge Management (KM)
Knowledge vis-à-vis data and information	Data is facts, raw numbers. Information is processed/ interpreted data. Knowledge is personalized information.	KM focuses on exposing individuals to potentially useful information and facilitating assimilation of information
State of mind	Knowledge is the state of knowing and understanding.	KM involves enhancing individual's learning and understanding through provision of information
Object	Knowledge is an object to be stored and manipulated.	Key KM issue is building and managing knowledge stocks
Process	Knowledge is a process of applying expertise.	KM focus is on knowledge flows and the process of creation, sharing, and distributing knowledge
Access to information	Knowledge is a condition of access to information.	KM focus is organized access to and retrieval of content
Capability	Knowledge is the potential to influence action.	KM is about building core competencies and understanding strategic know-how

Knowledge is derived from processed information or interpreted data (Alavi and Leidner, 2001). According to Alavi and Leidner (2001) knowledge can be viewed from the following five perspectives: 1) a state of mind, (2) an object, (3) a process, (4) a condition of having access to information, or (5) a capability. These perspectives and their implication for knowledge management are shown in Table 2-8. What can be

drawn from this table is that the conception of knowledge held by an organization can impact on the KM strategy adopted.

Table 2-9: Knowledge Taxonomies (adopted from Alavi and Leidner, 2001)

Knowledge Types	Definitions	Examples
Tacit	Knowledge is rooted in actions, experience, and involvement in specific context	Best means of dealing with illegal customers
Cognitive tacit:	Mental models	Individual's belief on cause effect relationships
Technical tacit:	Know-how applicable to specific Work	Meter connection skills
Explicit	Articulated, generalized knowledge	Knowledge of different customer groups in service area
Individual	Created by and inherent in the individual	Insights gained from WSP pilot
Social	Created by and inherent in collective actions of a group	Norms for communication between quality assurance team and engineers
Declarative	Know-about	What chemical is appropriate for water treatment
Procedural	Know-how	How to chlorinate
Causal	Know-why	Understanding why chlorine works
Conditional	Know-when	Understanding when to chlorinate
Relational	Know-with	Understanding how chlorine interacts with turbidity
Pragmatic	Useful knowledge for an organization	Best practices, business frameworks, project experiences, engineering drawings, customer reports

Knowledge is generally classified as either being explicit or tacit (Polanyi, 1966, cited in Nonaka, 1994). Explicit knowledge can be codified or written down while tacit knowledge can be felt and understood but not easily expressed (Watson, 2003). Where tacit knowledge is stored in an individual's head, explicit knowledge is stored as written documents or procedures (Anumba and Sohail, 2003). There are several other taxonomies of knowledge such as individual and social knowledge. Table 2-9 summarizes these different knowledge types and provides examples from the water sector.

The importance of both tacit and explicit knowledge is widely acknowledged by KM experts. For example, Nonaka et al (2000) mention the complementary nature of tacit and explicit knowledge indicating it is through their interaction that knowledge is

created. Despite the general agreement on the need to accommodate both tacit and explicit knowledge, researchers hold different views when it comes to the conversion of tacit knowledge into explicit knowledge. Where researchers like Nonaka et al (2000) have built knowledge creation models which incorporate the conversion between tacit and explicit knowledge, others like Watson (2003) discourage attempts to convert tacit knowledge into explicit knowledge arguing that such attempts often lead to the loss of tacit knowledge.

2.6.2 An Overview of Knowledge Management

There are several definitions of KM in the literature, for example, Watson (2003) writes "Knowledge management involves the acquisition, storage, retrieval, application, generation, and review of the knowledge assets of an organisation in a controlled way". Schultze and Leidner (2002 cited in Alavi et al 2005) describe KM as "The generation, representation, storage, transfer, transformation, application, embedding, and protection of organizational knowledge". Common among most of the definitions is their reference to the processes involved in KM.

The goal of KM is "for an organization to become aware of its knowledge, individually and collectively, and to shape itself so that it makes the most effective and efficient use of the knowledge it has or can obtain" (Bennet and Bennet, 2003) . There are several conceptualisations of the approaches taken in KM. For instance, Leidner et al (2006) differentiate between a process and a practice approach. The process approach puts emphasis on explicit knowledge and explicit policies may be put in place in obtaining KM objectives. In contrast, the practice approach supports the use of tacit knowledge. Unlike the process approach which uses formal systems to manage knowledge, the practice approach relies on social environments that facilitate the promulgation of tacit knowledge. Gamble and Blackwell (2001) describe four different process by which knowledge (classified as embodied, represented, or embedded) might be captured from different sources. Their KM matrix (Figure 2-7) shows the interaction between these processes and knowledge types and the range of tools that can be used.

Type / Approach	Embodied (tacit knowledge)	Represented (either tacit or explicit)	Embedded (applied knowledge)
Sense	**Observe**	**Gather**	**Hypothesize**
Listen Capture	Knowledge surveys Workshops/interviews Network analysis	Business intelligence Text and data mining Intelligent agents	Customer analysis Modelling/reasoning tools Reverse engineering
Organize	**Contextualize**	**Categorize**	**Map**
Categorize Personalize	Focus groups Expertise guides Knowledge coordinators	Knowledge taxonomies Libraries Data marts	Job/workplace design Workflow analysis Performance measures
Socialize	**Share**	**Disseminate**	**Simulate**
Share Collaborate	Mentoring/coaching Communities of practice Conferencing tools/groupware	Broadcast tools/ internet/intranet/email/ Distance learning Application systems	Scenario Planning After-action reviews Training/competency management
Internalize Understand Create new knowledge	**Apply-Decide-Act**		

Figure 2-7: KM Matrix (Gamble and Blackwell, 2001)

2.6.3 Knowledge Management Processes

The literature contains different descriptions of KM processes in terms of their numbers and categorization. Despite these differences, most of these studies consider "the four basic processes of creating, storing/retrieving, transferring, and applying knowledge" (Alavi and Leidner, 2001). A basic description of the process of knowledge creation is that it involves the interpretation of data (discrete facts) to generate information

(analysed and structured data). It is through the understanding of information that knowledge is created. Watson (2003) considers knowledge and the related concepts of data and information as existing along a continuum. These concepts show a link with their context and the level of understanding they convey or entail (

Figure 2-8).

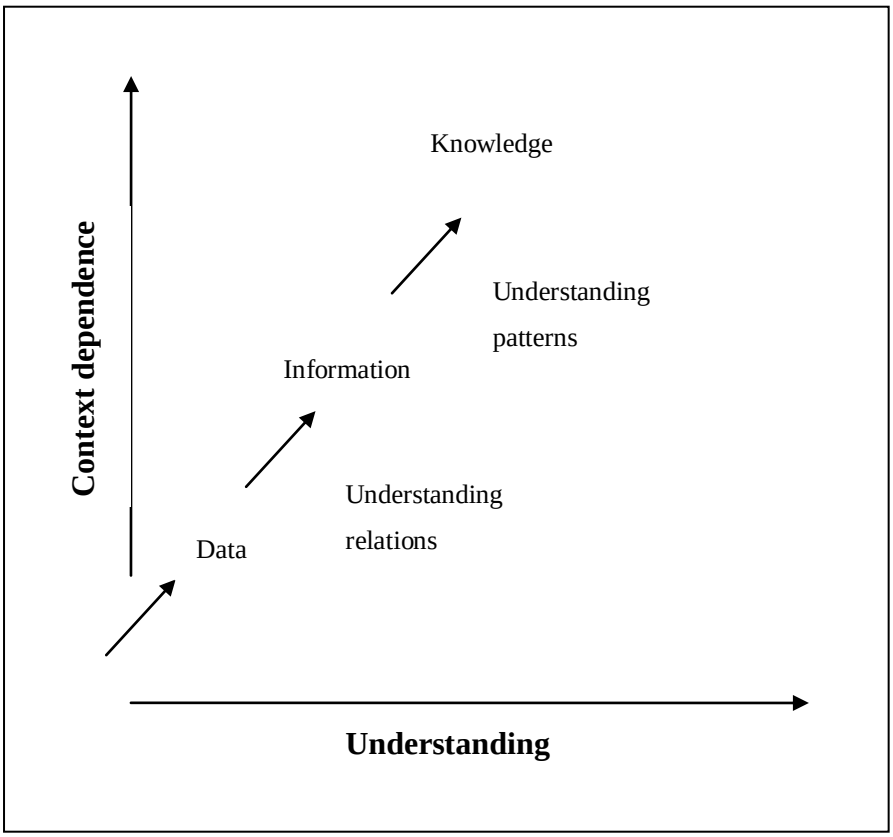

Figure 2-8: Relationship of context to understanding (After Watson, 2003)

Nonaka et al (2000) have developed a model of knowledge creation, built on previous work by Nonaka and his colleagues, which consists of three elements:

1. The SECI process of knowledge creation by conversion of tacit and explicit knowledge through: socialisation, externalisation, combination, and internalisation
2. 'Ba'- shared context for knowledge creation

3. Knowledge assets- "firm specific resources that are indispensable to create values for the firm". These are inputs, outputs and moderators of the knowledge-creating process such as trust

In this model organisations use existing knowledge to create new knowledge through the SECI process which takes place in 'ba' after which the newly created knowledge becomes the starting point for a new spiral of knowledge creation.

The storage/retrieval process refers to how organizations store the knowledge they poses and retrieve it for later use. This process is associated with the concept of organizational memory which "can be made of both hard data (such as numbers, facts, figures, rules, reports and other documents and rules) and soft information and knowledge (such as expertise, experiences, anecdotes, critical incidents, stories, artifacts, context information, details about strategic decisions, and tacit knowledge)" (Bennet and Bennet, 2003).

Advancements in information management systems have greatly influenced this process in many organizations. "Advanced computer storage technology and sophisticated retrieval techniques, such as query languages, multimedia databases, and database management systems, can be effective tools in enhancing organizational memory. These tools increase the speed at which organizational memory can be accessed" (Alavi and Leidner, 2001)

The transfer of knowledge occurs at different levels such as "between individuals, from individuals to explicit sources, from individuals to groups, between groups, across groups, and from the group to the organization" (Alavi and Leidner, 2001). This process is driven by communication and information flows. The application of knowledge in an organization can be enhanced by entrenching knowledge into its routines through technology (Alavi and Leidner, 2001). Technology can support knowledge application by embedding knowledge into organizational routines.

2.6.4 Culture and Knowledge Management

The relationship between culture and knowledge management has been widely studied. In particular, researchers have extensively looked at how KM is affected by organisational culture. Findings by Leidner et al (2006) suggest that different cultural perspectives influence KM in different ways (Table 2-10). They point out that in bureaucratic cultures the endorsement of senior management is of high importance while innovative cultures enable experimentation with KM. These findings also indicate "Individualistic cultures inhibit sharing, ownership, and reuse, while cooperative cultures enable the creation of virtual communities" (Leidner et al, 2006). Their research shows that behaviours associated with KM such as ownership and maintenance, sharing, and reuse of knowledge as being mostly influenced by the individualistic or cooperative nature of the culture.

Table 2-10: Organizational Culture's influence on KM (Leidner et al, 2006)

Cultural Perspective	Influence of Culture on Knowledge Management
Bureaucratic	Preference for an initial process approach to KM
	Creates expectation among members that senior management vision is essential to effective KM
Innovative	Enables subgroups to experiment with KM and develop KM systems useful to their group
Individualistic	Inhibits sharing, ownership, and reuse of knowledge
Cooperative	Enables evolution of process-oriented KM to practice-oriented KM
	Enables creation of virtual communities

Others have argued that organizational culture could be one of the most difficult challenges in the implementation of KM (O'Dell & Grayson, 1998; Gold et al, 2001; Fahey and Prusak, 1998). For example, Delong and Fahey (2000) consider

organisational culture to be a major barrier in leveraging intellectual assets and point to four ways in which culture influences behaviours critical to KM:

- Culture shapes assumptions on what knowledge comprises and the type of knowledge to be managed
- Culture identifies links between individual and organizational knowledge and influences behaviours affecting knowledge migration such as hoarding and sharing
- Culture creates social interaction contexts that determine the appropriate use of knowledge
- Culture influences the processes through which new knowledge is created, legitimised and distributed

Balafas et al (2004) describe the relationship between KM and organizational culture as continuously evolving and call for the focussing of efforts "on assessing the essential core values that will have an impact on the design of a KM scheme". Various researchers have established a link between organisational values and knowledge creation and sharing. For example, Leidner et al (2006) suggest that organisation culture can influence KM approaches "through its influence on the values organizational members attribute to individual vs. cooperative behaviour" and other aspects such as evolution of KM initiatives, migration of knowledge and by becoming embedded in the organizational culture. Janz and Prasarnphanich (2003) state "Organizational culture is believed to be the most significant input to effective KM and organizational learning in that corporate culture determines values, beliefs, and work systems that could encourage or impede knowledge creation and sharing". Lee and Choi (2000) indicate a positive relationship between knowledge creation and organisational values such as trust, collaboration, and learning. On knowledge sharing, Delong and Fahey (2000) reveal value orientations such as trust and collaboration can enhance knowledge sharing while value systems that accentuate individual power and competition can lead to knowledge hoarding behaviours.

Alavi et al (2005) consider this relationship to be more complex than previously thought and argue that organizational culture can impact both the KM needs and subsequent

KM-related behaviours of individuals. They show that organizational culture not only influences behaviours such as knowledge sharing and seeking but also influences expected KM outcomes, role of KM leaders, technology selection and appropriation, KM evolution and intra organization knowledge migration. Their model (Figure 2-9)

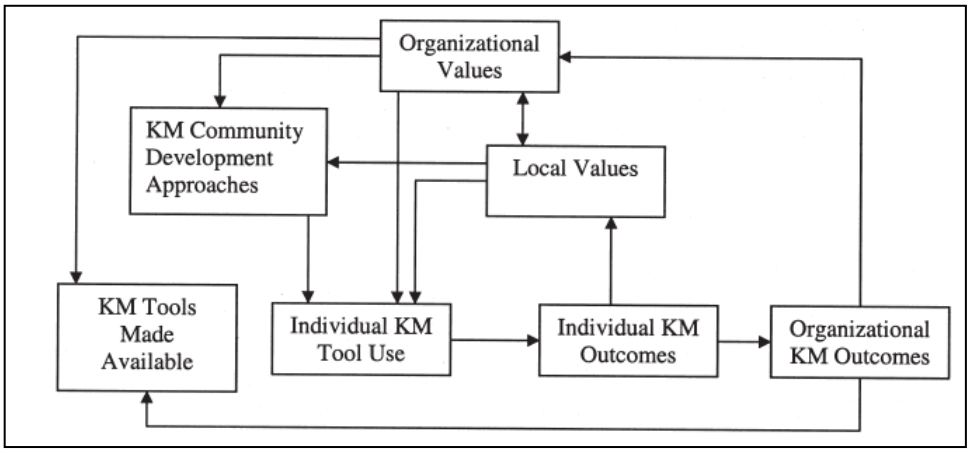

Figure 2-9: A model of organizational values and KM (Alavi et al, 2005)

reveals a more comprehensive picture of this relationship. This model shows a variety of values influencing KM approaches, tools made available, and individual KM tool use, which in turn influence both individual and organizational KM outcomes. In addition, "this model suggests that individual and organizational KM outcomes may, over time, shape organizational and local values" (Alavi et al, 2005).

2.6.5 WSPs and Knowledge Management

There are several parallels to be drawn between WSPs and KM. As seen in section 2.3, WSPs are mostly concerned with the collection of data, information generation and the creation of knowledge on the water supply system.

These processes are very similar to the activities engaged in KM. The knowledge component is of critical significance from the initial step of assembling the team to the last step of reviewing embedded knowledge. The WSP manual developed by Bartram et al (2009) lists typical challenges encountered during the different phases of WSP implementation. Many of these challenges can be linked to the KM process to different

degrees. In Table 2-11, several examples of explicitly identified KM related challenges are given.

Table 2-11: Knowledge Management Related Challenges in Different Stages of WSP Implementation

WSP Implementation Stage	Typical KM Related Challenge
Describing the water supply system	• Lack of accurate maps showing distribution systems; • Lack of knowledge of land use / management in catchments; • Lack of knowledge of industry and risks; • Finding all government and local agencies with potential information or a role to play; • Out-of-date procedures and documentation.
Identifying hazards and hazardous events and assessing the risk	• Uncertainty in assessment of risks due to unavailability of data, poor knowledge of activities within the water supply chain and their relative contribution to the risk generated by the hazard or hazardous event.
Determining and validating control measures, reassessing and prioritizing the risks	• Uncertainty in prioritizing the risks due to unavailability of data; poor knowledge of activities within the water supply chain and their relative contribution to the hazard type generated by the hazardous event as well as the risk score of the event.
Defining monitoring of the control measures	• Lack of knowledge of consumer satisfaction or complaints
Planning and carrying out periodic review of the WSP	• Keeping records of changes
Revising the WSP following an incident	• Focusing and acting on the positive lessons learned, rather than apportioning blame.

KM related challenges facing WSPs are more accentuated in developing countries. Two of five reasons, listed by Godfrey and Howard (2004), as necessitating the development of their guideline on WSP implementation in developing countries are linked to KM. These reasons are:

- "Limited data availability – Many systems in the developing world are only recently developing the culture of data collection and storage" and
- "System knowledge – Much of the information on the piped networks may not be available as records may have been removed by contractors, colonial powers"

Although the different WSP guidelines reviewed for this research do not use the terms explicit and tacit knowledge or associated words, there is also clear recognition on the importance of tacit knowledge. For example, Bartram et al (2009) indicate "Site visits need to include input from those who work at the sites or within catchments and have detailed local knowledge that may not have been captured within the utility's records". The GDWQ 3rd ed. (WHO, 2004) advises on considering local and community knowledge as a source of information. This guide indicates that "The community represents a resource that can be drawn upon for local knowledge and experience".

The importance of tacit knowledge may be more significant in developing countries because of the above KM related obstacles identified by Godfrey and Howard (2004). As an indication of their recognition on the importance of tacit knowledge, they advise that "In the absence of extensive data or computerized models, expert judgement should be used to identify the existing closed valves in the system and the known flow paths within the network".

2.6.6 Implementing Knowledge Management

When it comes to establishing KM initiatives at the organizational level, Balafas et al (2004) argue against the generic adaptation of KM frameworks and guidelines. They point to the low success rates in such attempts resulting from the multiplicity of situations and circumstances and as such, they suggest a more adaptive approach. Acknowledging the difficulty of introducing KM to an organisation, they point out to the need for "a lot of patience". Creating the right environment for KM to grow, they argue, will require carrying out a series of tasks including:

- Understanding the organisational culture and assessing the organisational climate
- Securing board-level commitment and sponsorship
- Integrating KM initiatives with critical business needs
- Building strategic relationships with the workforce and
- Adopting to the 'corporate vocabulary'

Australia's Department of Natural Resource and Mines (DNRM, 2005) identifies several factors which are necessary in the development of effective KM systems. These factors include:

- a culture of knowledge sharing within an organisation and with key stakeholders
- a process in place for:
    - capture of explicit knowledge
    - sharing tacit knowledge
    - continual learning and improving
- appropriate information systems in place to collect, analyse and transfer knowledge
- an understanding of what knowledge is required and where it can be accessed

Is it necessary to change an organization's culture before embarking on KM activities? **"**It is recommended that a KM scheme should be initiated by adapting to the organisation's core cultural values, in order to gain faster support" (Balafas et al, 2004). "Any kind of knowledge management has to start from that existing culture and may not require a cultural change as a prerequisite" (Schütt, 2003). This view is also shared by the author, attempting to change the culture prior to initiating KM might slow the process because of reasons such as resistance to change. Nonetheless, "As culture evolves and matures, in terms of KM, so must the KM scheme be readapted in order to drive the culture towards the next level of KM maturity" (Balafas et al, 2004).

2.7 Conclusion

Risk management in the water sector is entering a new phase showing a shift from reliance on end of pipe testing towards comprehensive risk management procedures encompassing the different stages of water supply from the catchment to the consumer. In developing countries, the implementations of WSPs are mostly at the pilot stage and their wide scale implementation will require the adoption of scaling up strategies. The consideration of culture is an important aspect in ensuring the success of such implementations. However, there is no material on culture and WSPs in developing

countries in the literature, hence a clear gap that requires filling. Culture is generally considered to have different components or layers varying from the easily visible to the deeply hidden. Many avenues and paths are considered legitimate in the study of culture. As much as knowledge management is influenced by culture, it also shapes culture and the relationship between the two is mutual. Different aspects of knowledge management are central to the implementation of WSPs. There are several parallels to be drawn between WSPs and knowledge management. WSPs are mostly concerned with the collection of data, information generation and the creation of knowledge on the water supply system. These processes that are very similar to the activities engaged in knowledge management.

3 METHODOLOGY

3.1 Introduction

This Chapter covers the theoretical underpinning on which this research is based. Here the philosophical and theoretical issues that have shaped this research are presented. The approach taken can be termed a 'multi-approach', by this I mean the study is based on a multi-paradigmatic style and is pegged in multiple theoretical frameworks. The adopted philosophical stance will be explained and related to decisions made regarding method of inquiry. This will be followed by an elaboration of the theoretical frameworks upon which this study is built. Prior to concluding the chapter, I will present the conceptual framework that guided this research.

3.2 Paradigm of Inquiry

Pronouncement of one's paradigmatic stance or at least its cognisance is generally expected of researchers. The work of Burrell and Morgan (1979) in which they consider a paradigm to be a "commonality of perspective which binds the work of a group of theorists together" presents a good starting point in explaining the paradigm of inquiry in this study. Burrell and Morgan's model indicates that assumptions regarding the nature of society and the nature of science are indicative of one's philosophical perspective.

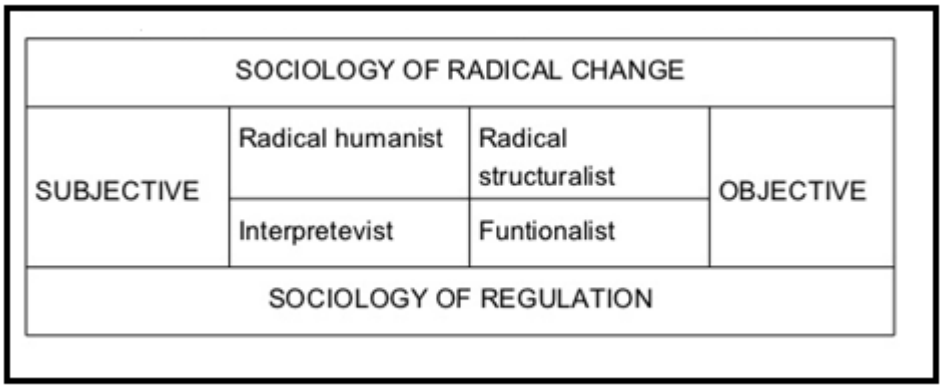

Figure 3-1: Four Paradigm Model of Social Theory (Burrel and Morgan (1979)

Their model is presented in a 2x2 matrix (Figure 3-1) presenting diametrical positions on the nature of science in the x axis and on the nature of society in the y axis.

The opposing positions on the x axis are "subjective" and "objective" in reference to the philosophical concepts of ontology (nature of reality/being/existence) and epistemology (nature of knowledge). This is also linked to debates on human nature concerning free will and determinism. The diametric positions on the y axis are presented by theories of regulation, assuming the rational evolution of society and its unified and cohesive state, and theories of radical change, based on the notion of a state of constant conflict in society seen through the struggle of humans to free themselves from of societal structures.

Burrel and Morgan categorized theories according to this matrix and labelled them as functionalist, interpretive, radical structuralist, and radical humanist paradigms. A researcher's position on these assumptions influences the choice of methodology. Issues surrounding these philosophical positions and my assumptions on them are summarised in Table 3-1.

Table 3-1: Ontological and Epistemological Issues

Longstanding Questions	Assumption Area	Subjective and Objective positions	My Views
Is reality given or is it a product of the mind?	Ontological-nature of reality	Nominalism: reality is created Realism: Reality is a concrete	Social reality could be both
Must one experience something to understand it?	Epistemological- Nature of knowledge	Positivism & Anti-positivism	Not necessarily, but, experience can enhance understanding
Do humans have free will or are we determined by our environment?	Human Nature	Determinism: predetermined Voluntarism-free will	Free will is there, yet there is a role for the environment.
Is understanding best achieved though the scientific method or direct experience?	Methodological-forms of data collection and analysis	Ideographic: detailed observation of society Nomothetic: hypothesis testing	Depends on the problem being addressed

Since its publication, Burrell and Morgan's classification of paradigms has faced several criticisms and has been revised by others in various ways. Cunliffe (2010) attributes such revisions to developments in metatheoretical perspectives, theories, and research

methods in addition to contestation surrounding the subject-object distinction. Burrell and Morgan have also faced criticisms for their arguments on the incommensurability of these paradigms and for their presentation of paradigm change as a rare event akin to religious conversion (ibid). Donmoyer (2012) traces the argument for incommensurability by Lincoln and Guba (1985) to a misinterpretation of Kuhn's notion of incommensurability and point out to Kuhn's assertion that incommensurability is not a synonym for logical incompatibility, thus "one need not be irrational to embrace different paradigms at different times to accomplish different purposes" (Donmoyer, 2012).

Among the several alternative approaches to science for social researchers Neuman (2003) mentions 3 main paradigms: positivist, interpretive, and critical social science. As shown in Table 3-2, each of these approaches is guided by its own set of philosophical assumptions, principles, and perspective on carrying out research.

Table 3-2: Philosophical Approaches in Social Research (Neuman, 2003)

Positivist	Interpretive	Critical
Purpose of research is scientific explanation in which universal laws of human behaviour are discovered and documented	**A**im of social research is developing an understanding of social life and discovering how people construct meaning in natural settings	**P**urpose of critical research is to change the world by revealing the underlying sources of social relations and empowering people, particularly the less powerful
Researcher should remain detached, neutral and objective. Science is free of personal, political, or religious values	**R**esearcher should reflect on, re-examine, and analyze personal points of view and feelings as a part of the process of studying others	**S**ocial reality is evolving and its constant change is rooted in the tensions, conflicts, or contradictions of social relations or institutions
People respond to external forces that are as real as physical forces on objects	**P**eople are engaged in creating flexible systems of meaning through social interaction and use such meanings to interpret their social world and make sense of their lives	**P**eople have a great deal of unrealized potential, are creative, changeable and adoptive, but can also be misled, mistreated and exploited by others
Common sense is inferior to science	**S**ocial reality is largely what people perceive it to be and not something waiting to be discovered	**C**ommon sense shapes human behaviour but it can be full of myth and illusion that masks an objective world in which there is unequal control over power and resources
Social theory should be similar to natural science theory with deductive axioms, theorems and interconnected causal laws	**N**either common sense nor scientific law has all the answers and neither is inferior or superior	**I**dentification of causal mechanisms, the trigger or the levers of social relations can explain how and why certain actions will bring about
Theory is true when it can be replicated		

Good evidence is observable, precise and independent of theory and values	or inferior to the other **S**ocial theory describes and interprets how people conduct their daily lives by revealing the meanings, values, interpretive schemes, and rules of living used by people **T**heory is true if it makes sense to those being studied and allows others to deeply understand or enter into the reality of those being studied **E**vidence cannot be isolated from the context in which it occurs or the meanings assigned to it by the social actors involved	change **E**xplanations are valued when they help people really understand the world and to take action that changes it **F**acts of material conditions exist independent of subjective perceptions, but the facts are not theory neutral. They require an interpretation from within a framework of values, theory and meaning **S**ocial research is a moral-political activity that requires the researcher to commit to a value position

Robson (2002) groups these approaches into positivist, relativist, post-positivism, constructivism and emancipatory approaches. Despite the difference in names, what Neuman describes as interpretive approach is similar to both Robson's descriptions of relativist and constructivist approaches while Robson's emancipatory approach is the same as Neuman's critical approach. Robson (2002) identifies feminist, Marxist, and action researchers as among those sharing similar concerns as critical theorists.

I find the philosophy of the interpretivists as being very relevant to this research given its aim and nature. I also consider the viewpoint of critical theorists to be very appealing. The appeal is in the concept of going a step beyond the understanding of the social world and including social action in the process, the concept of changing the world. This notion is central to the idea of WSPs. As such, I opt to adopt both paradigms. A multiparadigm approach "advocates possible connections and exchanges between paradigms. The multiparadigm position urges the use of multiple paradigms to acknowledge the variety of ontological and epistemological standpoints; it argues that the partial understandings that each paradigm gains can be associated, thereby, researchers can achieve richer knowledge" (Romani et al 2011).

The critical theorists point out the need to demystify social structures and pull back the veil on their surface appearances (Neuman, 2003). This point is of pragmatic significance in the process of cultural analysis. From the critical approach, the

researcher ought to go beyond careful observations since observing an illusion does not dispel it (Neuman, 2003). Even in cases where observations seem to make sense questions have to be asked because "Common sense tends to naturalize social phenomena and to assume that what is, must be. A social science which builds uncritically on common sense ... reproduces these errors" (Sayer, 1992, cited in Neuman, 2003)

The need to dig beneath the surface is important if complete sense is to be made out of the process. Critical theorists hold that interpretation of facts requires an understanding of history, adoption of a set of values, and knowing where to look for the underlying structure. From this perspective knowledge is power which can be used to control people and it can either be hidden away from the people and used by intellectuals to play games or given to the people to enhance their lives (Neuman, 2003). While this can be true, I think knowledge can also be intentionally ignored by those who could use it to enhance their lives as seen in many examples of advice on healthy living being overlooked.

While positivists make a case for a value free research, interpretivists question the possibility of this notion arguing that values and meaning are infused everywhere in everything including what positivist call value freedom, which in reality is the value of positivists (Neuman, 2003). This is a point which I agree with; a notion of value free social research is not transparent since no human being involved in such a process comes as a clean slate.

3.2.1 Induction and Deduction

The inductive approach has one beginning with detailed observations and then moving towards abstract generalizations and ideas (Neuman, 2003). In this way, the theory emerges from the data. The researcher "collects all the relevant facts and then examines them to see what theory is suggested by this set of all the relevant facts" (Wengraf, 2001). This process is also known as the "original grounded theory tradition in which theory emerges by a process of induction. The facts are believed to suggest or even 'require' or 'dictate' theorization" (Wengraf, 2001).

The deductivist approach requires beginning "with a body of prior theory, if only to decide which set of 'collectable fact' should be collected or generated" (Wengraf (2001). One begins with abstract and logical connections between concepts, and then moves to concrete empirical evidence (Neuman, 2003). The researcher uses the theory to generate a hypothesis whose truth or falsity is tested. The testing occurs through the selection of 'hypothesis relevant facts' which either support or refute the hypothesis (Wengraf, 2001).

3.2.2 Qualitative and Quantitative

The words qualitative and quantitative are used in describing both research design and data collection techniques. The main difference between qualitative and quantitative work is in the domination of words in the former and numbers in the later. Neuman (2003) differentiates between qualitative and quantitative styles on aspects such as assumptions and purposes as seen in Table 3-3.

Table 3-3: Qualitative and Quantitative Research Styles (After Neuman, 2003)

Quantitative Style Summary	**Qualitative Style** Summary
Measure objective facts	Construct social reality, cultural meaning
Focus on variables	Focus on interactive process, events
Reliability is key	Authenticity is key
Value free	Values are present and explicit
Independent of context	Situationally constrained
Many cases, subjects	Few cases, subjects
Statistical analysis	Thematic analysis
Researcher is detached	Researcher is involved

Qualitative researchers are more likely to take an inductive approach while quantitative researchers mostly take a deductive approach (Gorman and Clayton, 1997). The terms flexible and fixed designs are also used to describe qualitative and quantitative research respectively. Social research can either have a fixed design, such as in experiments and

surveys, or a flexible design making substantial use of methods which rely on qualitative data (Robson, 2002). Bernard (2006) categorizes data which is of interest to social scientists into individual attribute data and cultural data. Individual attribute data is concerned with aspects such as income and age of an individual in a population while cultural data is based on shared cultural facts which require more detailed knowledge. For example, it requires detailed knowledge to explain why a bride price is given compared to how many cows are given as a bride price.

This research's concern with aspects of human beliefs, experiences, attitudes, behaviour and interactions made it necessary to use qualitative design and data collection techniques. However, in the analysis of the data some quantitative analysis is done in order to create a more elaborate picture of the findings.

3.2.3 Purpose of Research

Most commentators on methodology use a tripartite classification to describe the purpose of research as exploratory, descriptive and explanatory. Table 3-4 compares the views of Hart, 2001; Robson, 2001; and Neuman, 2003 on these purposes.

Table 3-4: Different Purposes of Research

Purpose	Hart (2001)	Neuman (2003)	Robson (2002)
Exploratory	"to satisfy curiosity, provide better understanding or for general interest" "to examine the feasibility of study by indicating what might be relevant to study in more depth" "to provide illumination on a process or problem." "Questions focus on the how, what when and where. Studies tend to be small scale and often informal in structure, for example, illuminative evaluation."	"Become familiar with the basic facts, setting and concerns" "Create a general mental picture of conditions" "Formulate and focus questions for future research" "Generate new ideas, conjectures or hypothesis" "Determine the feasibility of conducting research" "Determine techniques for measuring and locating future data"	"To find out what is happening, particularly in little-understood situations." "To seek new insights" "To ask questions" "To assess phenomena in a new light" "To generate ideas and hypothesis for future research" "Almost exclusively of flexible design"
Descriptive	"to understand a common or uncommon social phenomenon by observing the detail of the	"Provide a detailed highly accurate picture"	"To portray an accurate profile of persons,

	elements that make it a phenomenon in order to provide an empirical basis for valid argument." "Questions focus on the how, what, when and where. Studies tend to be small scale and qualitative, for example, ethnomethodological research."	"Locate new data that contradict past data" "Create a set of categories or classify types" "Clarify a sequence of steps or stages" "Document a causal process or mechanism" "Report on the background or context of a situation"	events or situations" "Requires extensive previous knowledge of the situation etc to be researched or described, so that you know appropriate aspect on which to gather information" "May be flexible and /or fixed design"
Explanatory	"to explain the cause or non-occurrence of a phenomenon" "to show causal connections and relationships between variables of the types 'if A then B'" "to suggest reasons for events and make recommendations for change." "Questions focus on the why and aim to uncover laws and regularities of a universal nature. Studies can be large or small scale and are often based on hypothetico-deductivism and associated quantitative data."	"test a theory's prediction or principle" "Elaborate and enrich a theory's explanation" "Extend a theory to new issues or topics" "Support or refute an explanation or prediction" "Link issues or topic with a general principle" "Determine which of several explanations is best"	"Seeks an explanation of a situation or problem, traditionally but not necessarily in the form of causal relationship"

While a piece of research may have multiple purposes a particular purpose can be more dominant (Neuman 2003), and the dominant purpose might change as the study progresses (Robson, 2002). Robson (2002), building on Marshall and Rossman (1999), mentions the need to add a fourth emancipatory purpose as an indication of the 'action' viewpoint that is seen in various real world studies. This category is almost exclusively flexible in design and is focused on creating both opportunities and the will to embark on social action (ibid). I see this category as of particular importance to developing countries and marginalised societies for the impact it can have towards the enhancement of lives. This particular research has served all the aforementioned purposes at different stages.

3.2.4 Types of Social Research

Robson (2002) refers to social research as 'real world' research. Hart (2001) identifies six types of research which he differentiates in terms of their purpose and features (Table 3-5).

Table 3-5: Types of Research (after Hart, 2001)

Type	Purpose and features
Basic research	Contributes towards theory or knowledge through hypothesis formulation and testing. Applies a theory or method to a new area and evaluates the generalizability of propositions across time and space. Mostly done in response to 'what' and 'why' type of questions.
Applied research	Produces recommendations or solutions to a problem facing a particular people. The application of theoretical insights into the real world is at its core. Questions tend to be in the 'how' and 'when' form.
Summative evaluation	Assess and summarizes the main benefits of a policy, program or product for the purpose of judging the degree of generalizability. Involves reliance on abstraction and quantitative data
Formative evaluation	Improves a particular policy, program, or set of activities for a given group and at a particular place and time. The case study method and qualitative evidence are used to focus the research
Action research	Focuses on a specific problem or issue and used to help and empower a group help themselves by researching on issues affecting them. The research agenda is set by the subjects through bringing up of issues they strongly feel about.
Illuminative evaluation	Enlightens policymakers or practitioners to the dynamics of behaviours in similar situations so as to create an understanding and more appropriate attendance to those behaviours.

This investigation cuts across several of these research types. The features of basic research are seen through the implementation of cultural theories and the hope that this study will contribute towards knowledge and theory development in the area of investigation.

Also seen are the purposes and features of applied research noted in the recommendations produced towards improving the water safety portal (WSPortal), a collection of web based guidance on WSPs. Formative evaluation research features are seen in the study's focus on bettering risk management tools used in the water sector and in the use of the case study method and qualitative evidence. The other research

type whose features are seen in this study is action research because central to this work is the improvement of drinking water safety in developing countries.

3.2.5 Qualitative Research Approaches

Cresswell (2007) identifies the following five approaches to qualitative research: narrative, phenomenology, grounded theory, ethnography, and case study. The descriptions of these approaches are given in Table 3-6.

Table 3-6: Approaches to Qualitative Research (Creswell, 2007)

Approach	Description
Narrative	Focuses on studying one or two individuals where data is gathered from their stories.
Phenomenology	Describes the meaning of lived experience of a phenomenon or concept for several individuals. Focuses on reporting commonalities in such experiences
Grounded Theory	Moves beyond description to the generation of theory to explain what has been taken note of
Ethnographic Research	Focuses on determining how a culture works through examining shared patterns of culture and their meanings by way of extended interactive observation of an entire cultural group.
Case Study Research	Focuses on studying an issue through single or multiple cases within a certain context

Among these approaches, I opted for the case study approach. Reasons for this decision and further details on this approach are given in section 3.2.6.

Sampling Strategy

While quantitative research uses probability sampling in order to get the most representative sample, qualitative research uses non-probability sampling to choose a case based on specific content (Neuman, 2003). In qualitative research the focus is on how the sample depicts social life as opposed to how representative the sample is (ibid).

Non-probability sampling methods include quota sampling, purposive or judgemental sampling, convenience or haphazard sampling, chain referral (including snowball and respondent driven) and case control sampling which has elements of both probability

and non-probability sampling (Bernard, 2006). Table 3-7 gives a description of the main types of non-probability samples.

Chain referral is a generic name for snowball and respondent driven sampling. They are used to study hard to find or hard to study populations. When using the snowball technique, key informants and/or documents are used to locate one or two people in the population. These people are then asked to list others in the population and recommend a person to interview from the list. This process continues to a point of saturation where no new names are offered.

Table 3-7: Types of Non-probability Sample (Neuman, 2003)

Type of Sample	Principle
Haphazard	Obtain any cases in any convenient manner
Quota	Using haphazard methods obtain a preset number of cases in each of several predetermined categories that reflect on the population's diversity
Purposive	Using various methods to obtain all possible cases that fit a certain criteria
Snowball	Get cases using referrals from one or a few cases, and keep getting more cases from each case
Deviant case	Obtain cases that do not fit into the dominant pattern
Sequential	Get cases till there is no more new information or cases
Theoretical	Get cases that reveal aspects which are theoretically important to a particular setting/topic

Informants

When considering informants, a distinction can be made between key informants and specialized informants (Bernard, 2006). Key informants are knowledgeable about their culture and are willing to share their knowledge with the researcher. Specialized informants have certain competence in a particular cultural domain.

Data Collection Techniques

Common techniques used in collecting qualitative data include interviews, observations, and documentary analysis (Burges, 2004). Details of these techniques are given in Table 3-8.

Table 3-8: Qualitative Data Collection Techniques (After Burges, 2004)

Interviews	Observations	Documentary Analysis
• Structured-same set of questions asked in the same order and words in different interviews • Unstructured-conversation like and no predetermined questions • Semi-structured-guided interviews where guide includes pre-prepared questions	• Overt-people know they are being observed • Covert-people are not aware they are being observed	3 distinctions made between documents: • Primary & Secondary Primary have direct link with subject of study. Secondary are edited versions or transcriptions of primary • Public and private • Solicited and unsolicited

Stake (1995) indicates that a qualitative researcher "... records objectively what is happening but simultaneously examines its meaning and redirects its observations to refine or substantiate those meanings". When it comes to making assertions from observations he argues that "For assertions, we draw from understandings deep within us, understandings whose derivation may be some hidden mix of personal experience, scholarship, and assertion of other researchers". However, he also cautions on the need to be clear in stating when such assertions do occur and points out researchers often fail to label such leaps to conclusions as speculations and goes on to point that "An ethic of caution is not contradictory to an ethic of interpretation". He considers the role of a qualitative researcher to be the maintenance of rigorous interpretation during data gathering. He also indicates that researchers draw their own conclusions through observations and other data (Stake, 1995).

Because structured interviews "*do not fit easily into flexible design studies*" (Robson, 2002), and unstructured interviews are *"not an easy option for the novice"* (ibid), I opted for semi-structured interviews.

Analysing Data

Data analysis is described as "a messy, ambiguous, time-consuming, creative and fascinating process" used to bring "order, structure and meaning to the mass of collected data" (Rice-Lively, cited in Gorman and Clayton, 1997). Qualitative data is organized into categories based on themes, concepts or similar features from which the researcher creates new concepts, puts together conceptual definitions, examines the links among concepts and eventually, associating concepts to each other in terms of similar or oppositional sets which are interwoven into theoretical statements (Neuman, 2003). In case study analysis, ideas and evidence are mutually interdependent (Neuman, 2003). "So what is needed is not only the explanatory structure or mechanisms, but also knowledge of the particular set of circumstances" (Robson, 2002).

Yin (2009) identifies several techniques of linking data to propositions including: pattern matching, explanation building, time-series analysis, logic models, and cross case synthesis. In the interpretations of findings, he calls for the identification and addressing of rival explanations as an important alternative strategy to other explicit interpretation methods such as probability levels used in statistics. Yin (2009) mentions the following five analytic techniques to be used as part of and with other strategies:

- **Pattern Matching**

  Considered to be one of the most desirable techniques in case study anlysis, pattern matching compares an empirically based pattern with a predicted pattern. For explanory cases, patterns may be related to either the dependent or independent variable or both.

- **Explanation Building**

  A special type of pattern matching in which the goal is to analyze the case study data by building an explanation about the case. While stipulating presumed set

of causal links it is important to reflect some theoretically significant propositions in the explanations.

- **Logic Model**

  Just as in pattern matching, the process involves matching empirically observed events to theoretically predicted events. A complex chain of events is deliberately stipulated over an extended period of time where events are staged in repeated cause-effect-cause-effect patterns. This technique is used to analyze interventions that could produce their own immediate outcomes that lead to intermediate outcomes which can finally produce ultimate outcomes. Logic models are applicable to different units of analysis and situations such as an individual, an organization, or a program.

- **Time-Series Analysis**

  This is comparable to time series analysis conducted in experiments and quasi-experiments. When there is a single dependent or independent variable and a large number of relevant and available data points, statistical tests can be used to analyze the data. When there are mixed patterns across time non linear models can be used.

- **Cross-case synthesis**

  This technique specifically applies to multiple case analyses and involves the creation of word tables to display data from the individual cases according to a uniform framework. Analysis in patterns in the word table should help bring out key concepts and strategies.

Miles and Huberman consider analysis as being comprised of three concurrent 'flows of activity': data reduction, data display, and conclusion drawing/verification (Robson, 2002). The need to reduce data emanates from the large amounts of qualitative data collected from the field. Robson makes several suggestions to assist in this activity:

- *Session Summary Sheet*: This involves the preparation of single sheet summing up what has been obtained after a data collection session and processing

- *Document Sheet*: A sheet prepared after each document to clarify context and significance and summarize content of lengthy documents

Data display is an important aspect of dealing with overwhelming amount of data that can easily become hidden in folders and subfolders. As stated by Robson (2002) "The mantra is: 'you know what you display'". To overcome difficulties associated with unseen data, better organization through the use of tools such as charts, matrices and networks is recommended. Memoing and Coding, described below, are two important methods which can assist with the reduction of data and its display.

Memoing: Anything that occurs to the researcher during the project and its analysis is considered to be a memo. They are attempts to link data together or suggest a certain part falls within a more general category (ibid).

Coding: Involves the organization of raw data into conceptual categories and creation of themes or concepts which are used to analyse data (Neuman, 2003). Strauss (1987, cited in Neuman, 2003) defines three kinds of coding:

> ***Open coding***: This is a first pass through new data where the researcher locates themes and assigns initial codes or labels which condense the data into categories. The process brings themes to the surface from deep inside the data.
>
> ***Axial coding*****:** This is considered as a second pass through the data, focussing on the initial coded themes more than the data. The researcher questions the causes and the consequences, conditions and interactions, strategies and processes, and looks for categories or concepts that cluster together
>
> ***Selective coding*****:** This is a last pass through the data at which point the major themes of the research have been identified. The researcher selectively looks for cases that illustrate themes and makes comparisons and contrasts.

When it comes to drawing conclusions Miles and Huberman list thirteen tactics for drawing conclusions (Robson, 2002):

1. *Noting patterns themes and trends*
2. *Seeing plausibility* Is there any sense in the trends patterns and conclusions?
3. *Clustering* Grouping of items such processes, events, and people together when they share patterns or characteristics
4. *Making metaphors*

5. *Counting* Looking at frequency of occurrence of recurrent events
6. *Making contrasts and comparisons* Finding similarities and differences between and within data
7. *Partitioning variables* Splitting of variables can result in finding more coherent descriptions and explanations
8. *Subsuming particulars into the general* Linking of specific data to general concepts and categories
9. *Factoring* Trying to discover the factors underlying the process being investigated
10. *Noting Relations between variables* Using of methods such as matrix display to analyse correlations between different data parts
11. *Finding intervening variables* Establishing the presence and effects of variables intervening between observed variables
12. *Building a logical chain of evidence* Developing logical relations to understand trends and patterns
13. *Making conceptual/theoretical coherence* progressing from data to constructs to theories through analysis and categorization.

There are several software designed at assisting in qualitative data analysis such as: Ethnograph, NVivo, Nudist, and Atlas-Ti. The use of software as an assistant and not completely relying on it for analysis is something researchers need to be aware of. As pointed out by Yin (2009, "The software will not do any analysis for you, but it may serve as an able assistant and reliable tool".

3.2.6 The Case Study Approach

Given the aims and objectives of this research, among the different approaches to qualitative research described above, the case study approach seems most suitable for this work. Yin (2003) describes a case study as "an empirical inquiry" that "relies on multiple sources of evidence" to "investigate a contemporary phenomenon within its real-life context…"

Despite its concern with culture, this research does not lend itself to becoming ethnographic since it is not solely concerned with determining how a particular culture

works. And because of its concern with culture: "The case study is the method of choice when the phenomenon under study is not readily distinguishable from its context" (Yin, 2003). In addition, the capacity of a case study, "to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies" (Yin 2009), makes it appropriate for this research. This approach suits the need to cover contextual conditions that are relevant to the implementation of WSPs in developing countries.

For research purposes, Yin (2003) identifies six types of case studies. First, they can either be single case studies focusing on one case or multiple case studies which include two or more cases within the same case. And then, the single or the multiple cases can either be exploratory, descriptive, or explanatory to make the six different types of case studies. In their design, both single and multiple case studies can have one or more than one units of analysis. A unit of analysis can be a person, an event or some other entity other than a single individual (Yin, 2009). As shown in Figure 3-2, depending on the number of units of analysis, both single and multiple case designs can either be holistic or embedded (Yin, 2009).

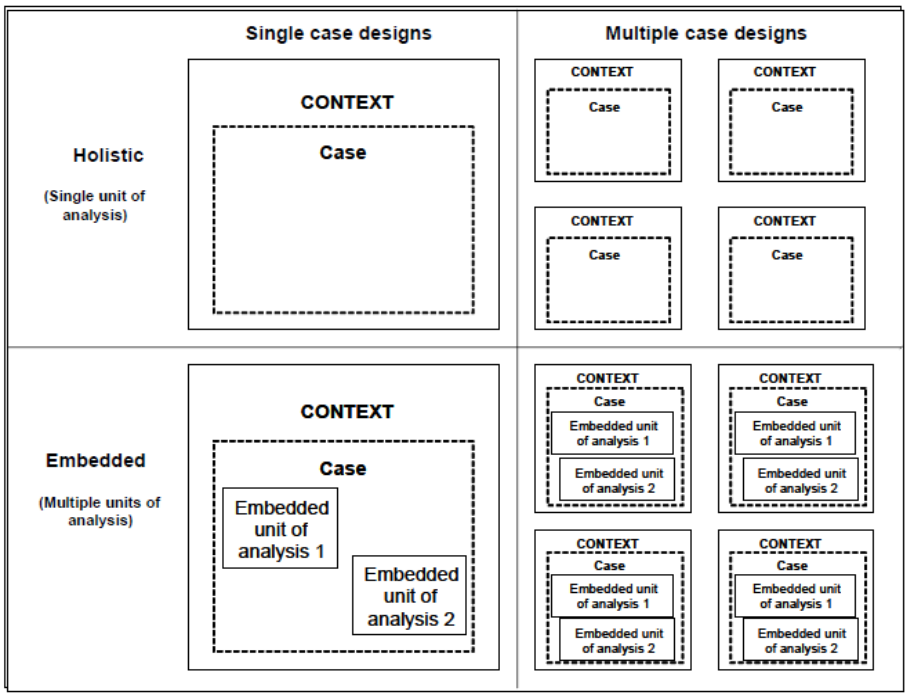

Figure 3-2: Case Study Design (Yin, 2009)

Reliance on theoretical concepts is strategically important in guiding the design and data collection for successful case studies (Yin, 2003). This guiding role is applicable to all case studies whether designed to be exploratory, descriptive or explanatory. As such, this research relied on theoretical concepts in guiding both the design and data collection of this study.

The use of theoretical concepts as a guide contributes towards the development of preliminary concepts at the beginning of a case study. Such concepts, according to Yin (2003), serve several purposes such as:

1. "... to place the case study in an appropriate research literature...";
2. "... to help define the unit of analysis...";
3. "... to identify the criteria for selecting and screening potential candidates for the cases to be studied..." and
4. "... to suggest the relevant variables of interest and therefore data to be collected as part of the case study".

Some of the main strengths of the case study approach include the ability to use a variety of sources, diverse types of data, and a mixture of research methods (Denscombe, 2003). This research's concern with aspects of human beliefs, experiences, attitudes, behaviour and interactions made it necessary to use qualitative data collection techniques composed of semi-structured interviews, observations, and documentary analysis.

In response to criticisms of the case study approach, Robson (2002) points out the need to "separate out criticisms of the practice of particular case studies from what some have seen as inescapable deficiencies of the strategy itself" and makes the central point that "case study is not a flawed experimental design; it is a fundamentally different strategy with its own designs".

In conducting a case study Yin (2009) points the following skills as being desirable:

- good knowledge of the issues being studied;
- ability to ask good questions and interpret the answer;
- being a good "listener";

- being adaptive and flexible and
- being unbiased by preconceived notions

Awareness of these qualities and conscious striving towards achieving them was central to this research.

3.3 Theoretical Framework

In line with the critical epistemology this research integrates the teachings of various social sciences and as such is informed by a multidimensional theoretical framework. In addition, a multi-paradigmatic approach has been taken in the choice and inclusion of theoretical frameworks. As such, some of the theories being used might be grounded in paradigms that are different to the ones adopted for this study. Drawing upon institutional theory, cultural constructs, and management literature this research seeks to elucidate the impact of culture on managing drinking water risks, particularly as it relates to the implementation of WSPs in developing countries. In the following sections I will provide an overview of these theoretical constructs and highlight the interconnections between some of them. This research uses different cultural theories in its examination of cultural factors impacting the implementation of WSPs. The application of these theories results from this research's focus on the interplay between local and organizational culture.

3.3.1 Cultural Theories

The term "cultural theories" is used here in reference to various theoretical conceptualizations of culture. Various models developed by researchers to facilitate cultural studies are discussed below.

- **Hall's Cultural Contexts and Dimensions**

In developing his model, the American anthropologist Edward T. Hall used the high-context (HC) and low context (LC) and monochronic and polychronic dimensions. His assumptions regarding these dimensions relate to both issues of external adaptations and internal integration (Schneider and Barsoux, 1997). Built on qualitative insights rather than quantitative data, Hall's model does not rank countries, but countries can be

generally grouped around each dimension. In looking at Hall's work, we will first start with the HC and LC concept.

High-Context versus Low-Context

Hall's distinction of LC and HC cultures has led to the polarization of countries, an effect that was not wanted by Hall (Holden, 2002). Mead (1994) clarifies that no particular country can be placed at any end of the scale and that each country shows HC cultural behaviour and LC cultural behaviour at different points. Nonetheless, HC countries generally include Japan, China, Korea, Vietnam, Mideast, Mediterranean, and other Asian countries, LC countries, USA, and the Scandinavian countries (Mead, 1994). The high and low context dimension is concerned with communication. According to Hall, all "information transaction" can be grouped as being of high, low, or middle context. "High context transactions feature pre-programmed information that is in the receiver and in the setting, with only minimum information in the transmitted message.

Table 3-9: High and Low Cultural Context (Adapted from Mead, 1994)

Cultural Aspect	High-context Cultures	Low-Context
Relationships	-Relatively long lasting -Deep personal involvement with each other	-Relatively shorter in duration -In general deep personal involvement valued less
Communication	-Because of a shared code, it is economical, fast and efficient in a routine situation e.g. Japanese "Haragei" or "belly language"	-Must be made explicit and sender relies less on receiver inferring from context
Authority	-Those in authority personally responsible for subordinates' actions -Value on loyalty to superiors and subordinates	-Diffused throughout bureaucratic system and hard to pin down personal responsibility
Agreements	-Verbal between members -Can be renegotiated	-Tend to be written -Contacts treated as final and legally binding
Insiders and Outsiders View	-Closely distinguished	-Less closely distinguished
Patterns	-Ingrained and slow to change	-Faster to change

Low context transactions are the reverse. Most of the information must be in the transmitted message in order to make up for what is missing in the context" (Hall, 1976). Table 3-9 presents the different aspects of HC culture and LC cultures.

In the creation and interpretation of communications, cultures that are of HC have high dependence on the external environment, situation, and non-verbal behaviour. From birth, group members learn to make sense of the covert clues used in certain communication context such that most meaning is passed on indirectly. In cultures such as Arabic, Chinese and Japanese, the ability to communicate indirectly along with the ability to understand are valued (Mead, 1994). In LC cultures, there is dislike for ambiguity and preference for explicit information. In LC cultures, there is a tendency to ignore non-verbal behaviour and the environment is not valued as much (ibid). This concept shows HC cultures which value relationships and information more than schedules, tend to have a very fast and free flow of information, while in LC cultures, where everything tends to follow procedures, the information flow tends to be slow. Dahl (2004) describes the high/low context concept as having far ranging and reaching implications from interpersonal to mass communication and also as being one of the most regularly used concepts when analysing, for example, face-to-face communication.

Monochronic versus Polychronic

The monochronic versus polychronic aspect of Hall's work is concerned with the manner in which a culture structures its time. In monochronic cultures, as shown in table 4.2, the time concept is based on the notion of "one thing at a time" (Dahl, 2004). Examples of monochronic cultures which view time as limited, as being finite and like money include Anglo-Saxons and Northern European cultures (Schneider and Barsoux, 1997). For the polychronic cultures "time is experienced as unlimited and simultaneous" (ibid). Polychronic cultures such as Africans, Middle Eastern, and Latin Europeans consider interpersonal relation to be more important than the time schedule and many tasks are handled simultaneously.

Hall's concepts will be important in implementing WSPs. This model will cover how messages are passed and also help understand the relationships that exist and the view of authority. In the development of the WSPortal it would be important to clarify situations surrounding the usage of a word since HC cultures tend to use words with multiple meanings. The attachment of a meaning to a word only occurs after understanding of the context. Being aware of LC and HC cultural differences can also

reduce communication difficulties. Schneider and Barsoux (1997) point out that this difficulty can even be more pronounced where participants share a common language. The authors give the example of British managers finding presentations by Americans as exasperating because everything is spelled out even though the meaning seems perfectly obvious. Understanding the manner in which words are said is also important. While Arabs and Mediterranean may show loudness to express comfort and friendship, for the Japanese ".... silence is an indication of mutual trust. Close friends drink silently together" (Schneider and Barsoux, 1997). Among the criticisms of the monochronic versus polychronic concept have been the lack of empirical data that increases difficulty in research application especially in cultures that are viewed as being close to each other and the lack of a broad explanation of underlying values (Dahl, 2004).

- **Hofstede's Cultural Dimensions**

Hofstede based his work on a large research project that looked at the differences in national culture among matched samples of IBM employees in 50 countries. Through this world renowned IBM study and follow up work, Hofstede identified five independent dimensions of national culture differences which he labelled power-distance, individualist-collectivist, uncertainty avoidance, long-versus short-term orientation, and masculinity-femininity.

These dimensions, Hofstede (2001) points out, are each rooted in a basic problem facing all societies and yet having a different solution. Dahl (2004) describes Hofstede's work as the most famous and the most cited in the area of analysing cultural patterns pointing out that "It is particularly useful, as it reduces the complexities of culture and its interactions into five relatively easily understood cultural dimensions." Each of these dimensions is reviewed below.

Power-Distance

The Power distance dimension is defined as "the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally", where institutions are used for basic social elements like family, schools and community; organizations are used for work places (Hofstede,

1991). The power-distance dimension is involved with human inequality which is usually formalized in boss-subordinate relationship (Hofstede, 2001). In explaining the hierarchical aspect of this dimension Hofstede reflects on animals that show dominance behavior. It is common among cats to show an order of seniority and also common among chicken to show a 'pecking order'. Hofstede borrowed the term power distance from the Dutch Social Psychologist Mauk Mulder, who defines it as: *"The power distance between a boss B and a subordinate S in a hierarchy is the difference between the extent to which B can determine the behavior of S and the extent to which S can determine the behavior of B"* (Hofstede, 2001). In his IBM study, Hofstede gave each country a score on a Power Distance Index (PDI) derived from country mean scores or percentages on three survey questions.

Table 3-10: Key Differences between Low and High PDI Societies. (Hofstede, 1991 & Hofstede, 2001)

Low PDI	High PDI
✓ Parents treat children as equals ✓ Children treat parents as equals ✓ Teachers expect initiatives from students in class ✓ Teachers are experts who transfer impersonal truths ✓ Student treat teachers as equal ✓ More educated persons hold less authoritarian values than less educated persons ✓ Hierarchy in organizations means an inequality of roles, established for convenience ✓ Decentralized decision structures at work ✓ Narrow salary range between top and bottom of organization ✓ Subordinates expect to be consulted ✓ The ideal boss is a resourceful democrat ✓ Privileges and status symbols for managers are frowned upon	✓ Parents teach children obedience ✓ Children treat parents with respect ✓ Teachers are expected to take all initiatives in class ✓ Teachers are gurus who transfer personal wisdom ✓ Students treat teachers with respect ✓ Authoritarian values independent of education ✓ Hierarchy in organizations reflects the existential inequality between higher-ups and lower-downs ✓ Centralized decision structures ✓ Wide salary range between top and bottom organization ✓ Subordinates expect to be told what to do ✓ The ideal boss is a benevolent autocrat or good father ✓ Privileges and status symbols for managers are both expected and popular

The countries were thus ranked as low PDI or high PDI. Table 3-10 shows the key differences between low and high PDI societies. In low PDI societies infertility is no reason for divorce and children play no role in old age security of parents. In high PDI societies children are not seen as competent until at a later age and parents supposed to side with teachers to keep students in order.

Individualist-Collectivist

Hofstede (2001) points out that while wolves are gregarious and tigers are solitary, human beings are gregarious, although different human societies differ in levels of gregariousness. "Individualism pertains to societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family. Collectivism as its opposite pertains to societies in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty." (Hofstede, 1991)

This dimension is Hofstede's most researched and discussed probably because of the high level of visibility and ease of grasp when looking at other cultural behavioral patterns (Dahl, 2004). In measuring this dimension, Hofstede uses an individualism index (IDV) to rank countries into low and high IDV societies. Table 3-11 compares low IDV and high IDV societies. In low IDV societies which are also referred to as 'collectivist', there is a "we" consciousness, a collectivity orientation, and identity is based in the social system.

This is well captured in the words of the Kenyan philosopher Mbiti (1969) in his description of the African state of being: *"I am because we are, and since we are therefore I am."* High IDV *societies*, also termed 'Individualist', are considered to be modern or post modern societies. There is a self orientation, value standards do not differ among 'in-groups' and 'out-groups' and are 'guilt' based cultures as opposed to being 'shame' based.

Table 3-11: Key Differences between Low IDV and High IDV Societies (Hofstede, 1991 & Hofstede, 2001)

Low IDV	High IDV
✓ People are born into extended families or other in-groups which continue to protect them in exchange for loyalty ✓ Identity is based in the social network to which one belongs ✓ Children learn to think in terms of 'we' ✓ Harmony should always be maintained and direct confrontations avoided ✓ High-context communication ✓ Trespassing leads to shame and loss of face for self and group ✓ Purpose of education is learning how to do ✓ Diplomas provide entry to higher status groups ✓ Relationship employer-employee is perceived in moral terms, like a family link ✓ Hiring and promotion decisions take employees' in-group into account ✓ Management is management of groups ✓ Relationships prevail over task	✓ Everyone grows up to look after him/herself and his/her immediate (nuclear) family only ✓ Identity is based in the individual ✓ Children learn to think in terms of 'I' ✓ Speaking one's mind is a characteristic of an honest person ✓ Low-context communication ✓ Trespassing leads to guilt and loss of self-respect ✓ Purpose of education is learning how to learn ✓ Diplomas increase economic worth and/or self-respect ✓ Relationship employer-employee is a contract supposed to be based on mutual advantage ✓ Hiring and promotion decisions are supposed to be based on skills and rules only ✓ Management is management of individuals ✓ Task prevails over relationship

Masculinity-Femininity

In this dimension masculinity relates to societies which have clearly distinct social gender roles "i.e., men are supposed to be assertive, tough, and focused on material success whereas women are supposed to be more modest, tender, and concerned with the quality of life". Femininity relates to societies in which there is an overlap in social gender roles "i.e., both men and women are supposed be modest, tender, and concerned with the quality of life" (Hofstede, 1991).

Hofstede labelled this dimension 'masculinity versus femininity' because it was the only one in which men and women scored consistently different in the IBM research. A masculinity index (MAS) was used to rank the countries in this dimension. Countries

fell into low MAS (feminine) and high MAS (masculine) groupings. Table 3-12 shows the key differences between low MAS and high MAS societies.

Table 3-12: Key Differences Between Low MAS and High MAS Societies (Hofstede, 1991 & Hofstede, 2001)

Low MAS	High MAS
✓ Dominant values in society are caring for others and preservation	✓ Dominant values in society are material success and progress
✓ People and warm relationships are important	✓ Money and things are important
✓ Everybody is supposed to be modest	✓ Men are supposed to be assertive, ambitious, and tough
✓ Both men and women are allowed to be tender and to be concerned with relationships	✓ Women are supposed to be tender and to take care of relationships
✓ In the family, both fathers and mothers deal with facts and feelings	✓ In the family, fathers deal with facts and mothers with feelings
✓ Both boys and girls are allowed to cry but neither should fight	✓ Girls cry, boys don't; boys should fight back when attacked, girls shouldn't fight
✓ Sympathy for the weak	✓ Sympathy for the strong
✓ Average student is the norm	✓ Best student is the norm
✓ Failing in school is a minor accident	✓ Failing in school is a disaster
✓ Friendliness in teachers appreciated	✓ Brilliance in teachers appreciated
✓ Boys and girls study same subjects	✓ Boys and girls study different subjects
✓ Work in order to live	✓ Live in order to work
✓ Managers use intuition and strive for consensus	✓ Managers expected to be decisive and assertive
✓ Stress on equality, solidarity, and quality of work life	✓ Stress on equity, competition among colleagues, and performance
✓ Resolution of conflicts by compromise and negotiation	✓ Resolution of conflicts by fighting them out

Uncertainty Avoidance

Hofstede defines uncertainty avoidance as "the extent to which the members of a culture feel threatened by uncertain or unknown situations" (Hofstede, 1991). Countries are ranked according to an uncertainty avoidance index (UAI). Table 3-13 shows the main differences between low UAI and high UAI societies.

Table 3-13: Key differences between Low UAI and high UAI societies (Hofstede, 1991 & Hofstede, 2001)

Low UAI	High UAI
✓ Uncertainty is a normal feature of life and each day is accepted as it comes ✓ Low stress; subjective feeling of well-being ✓ Aggression and emotions should not be shown ✓ Comfortable in ambiguous situations and with unfamiliar risks ✓ What is different, is curious ✓ Students comfortable with open-ended learning situations and concerned with good discussions ✓ Teachers may say 'I don't know' ✓ Hope of success ✓ Tolerance of deviant and innovative ideas and behavior	✓ The uncertainty inherent in life is felt as a continuous threat which must be fought ✓ High stress; subjective feeling of anxiety ✓ Aggression and emotions may at proper times and places be ventilated ✓ Acceptance of familiar risks; fear of ambiguous situations and of unfamiliar risks ✓ What is different, is dangerous ✓ Students comfortable in structured learning situations and concerned with the right answers ✓ Teachers supposed to have all the answers ✓ Fear of failure ✓ Suppression of deviant ideas and behavior, resistance to innovation

Long-Versus Short-Term Orientation

"Long Term Orientation stands for the fostering of virtues oriented towards future rewards, in particular, perseverance and thrift. Its opposite pole, Short Term Orientation, stands for the fostering of virtues related to the past and present, in particular, respect for tradition, and preservation of 'face' and fulfilling social obligations." (Hofstede, 2001)

This dimension was developed after the IBM studies. It came about as a result of the Chinese Value Survey (CVS) given to a sample of students from 23 countries. Hofstede (2001) attributes the failure to find this dimension in the IBM research to "the Western minds of the designers of the IBM questionnaire....." The countries were ranked on a Long-Term Orientation Index (LTO). The results showed that the top five positions were taken by China, Hong Kong, Taiwan, Japan and South Korea. While European and other Western countries are on the lower half, other non European countries such as Zimbabwe, Philippines, Nigeria and Pakistan are also at the bottom end. Hofstede (2001) points out "...this dimension does not oppose East to West; it splits the world

along new lines." Table 3-14 below shows key differences between short and long term oriented societies

Table 3-14: Key difference between low LTO and High LTO Societies

Low LTO	High LTO
✓ Quick results expected ✓ Nice people know how to spend ✓ Respect for traditions ✓ Reciprocation of greetings, favours and gifts ✓ Most important events in life occurred in past or occur in present ✓ Strong need for affiliation in traditional children's stories ✓ Less satisfied with daily human relations ✓ Analytic thinking ✓ All siblings are equal ✓ Investment in mutual funds ✓ Fuzzy problem solving	✓ Persistence, perseverance ✓ Nice people are thrifty, sparing with resources ✓ Adaptation of traditions to new circumstances ✓ Most important events in life to occur in future ✓ Daily human relations (family, neighbourhood, friends) satisfying ✓ Synthetic thinking ✓ Difference based on age and sex ✓ Investment in real estate ✓ Structured problem solving

3.3.2 Institutional Theory

Institutional theory is a multidisciplinary theory that is utilized in the examination of systems that range from interpersonal interactions to global level structures (Scott, 2004). The roots of this theory are traced to works in sociology, economics and political science (Scott, 2001; Powell and Dimaggio, 1991) involving scholars such as Marx, Weber and Mead (Scott 2004). The utilization of this theory across the social sciences has resulted in various adaptations. Given the subject of this research I will mostly draw from sociology based institutional theory while paying regard to other relevant concepts from the broader theory.

Earlier conceptualizations of the theory are associated with Selznick's work in the 1940's and 1950's (Selznick, 1996) among others. These earlier theorizations focussed on the role of institutions in inter-organizational integration by means of universalistic rules, contracts and authority (Thornton and Ocasio, 2008). Theoretical arguments formulated in 1977 by scholars such as Meyer and Rowan, and Zucker are considered to

be the foundation of the later conceptualizations of the theory commonly referred to as neo-institutionalism (Scott, 2008). These researchers zoomed in on the role of culture and cognition in their institutional analysis focusing on aspects such as taken-for-granted rules (Thornton and Ocasio, 2008).

As expected in a theory that draws from diverse fields, there are different definitions of what is an institution. For example, North (1990) defines institutions as "any form of constraint that human beings devise to shape human interaction". These constraints are also viewed as rules. For instance, Lane and Ersson (1999) define an institution as "a rule that has been institutionalized" and make distinctions between soft and hard institutions (Pennington, 2009). Hard institutions are formal rules such as legal laws whose infringement is dealt with through legal sanctions such as fines or jail term. Soft institutions, on the contrary, are informal rules such as cultural traditions which are maintained through habit and enforced through informal sanctions such as social exclusion.

Scott (2001) considers institutions as being variously comprised of "cultural-cognitive, normative and regulative elements that, together with associated activities and resources, provide stability and meaning to social life". These elements, according to Scott, are present in various combinations and their dominance varies among institutions and across time. In addition, these elements "... may not be aligned, and one may undermine the effects of the other" (Scott, 2004).

Regarding the relationship between institutions and organizations, North (1990) argues "If institutions are the rules of the game, organizations are the players". DiMaggio and Powell (1983) consider organizational field as "a recognised area of institutional life: key suppliers, resources and product consumers, regulatory agencies and other organisations that produce similar services and products". This arena, also considered as institutional environment, is "characterized by the elaboration of rules and requirements to which individual organizations must conform if they are to receive support and legitimacy…" (Scott and Meyer, 1983).

The concept of institutional logics first introduced by Alford and Friedland (1985) and later developed by Friedland and Alford (1991) is used to explore "the interrelationships

between individuals, organizations, and society" (Thornton and Ocasio, 2008). Friedland and Alford consider institutions as supraorganizational patterns of activity embedded in material practices and symbolic systems. The production and reproduction of material lives by individuals and organizations and the rendering of experiences meaningful occurs through institutions. They consider each institutional order as having a central logic that not only guides its organizing principles but also provides the actors with language of reason and a sense of identity.

Thornton and Ocasio, (1999) define institutional logic as "the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality". Building on the work of Friedland and Alford (1991) society is viewed as "an inter-institutional system" (Thornton and Ocasio, 2008). In this view society is seen as being comprised of various sectors each representing a distinct collection of expectations for human and organizational behaviour and social relations (Thornton and Ocasio, 2008). Here, there are multiple sources of rationality, and any context is viewed as being "... potentially influenced by contending logics of different societal sectors" (Thornton and Ocasio, 2008). According to this conception, the identities, values, ideas and interests of individuals and organizations are deeply rooted within the prevailing institutional logics (Thornton and Ocasio, 2008).

Inherent in institutional logic is the idea of embedded agency which presupposes the partial autonomy of individuals, organizations, and institutions, "... this perspective suggests that while individual and organizational action is embedded within institutions, institutions are socially constructed and therefore constituted by the actions of individuals and organizations (Berger and Luckmann, 1967)" (Thornton and Ocasio, 2008). Actors are considered to be "institutionally constructed" while at the same time possessing different capability levels to change "the rules, norms and beliefs that guide—but do not determine—their actions" (Scott, 2004). This is an important factor that deals with issue of agency. What this means is the behaviour of actors—whether individuals or other social entities—is shaped by the institutions and yet the actors can effect change on the same institutions.

"The boundaries of organizational fields are often vague or weak, allowing alternative logics to penetrate and support divergent models of behavior" (Scott, 2004). This view is of particular importance in the water provision field of developing countries which is shaped by the institutional logics of local community, donors, the state, and different water professionals. "First, we needed to recognize that institutional environments are not monolithic, but often varied and conflicted" (Scott, 2004).

3.3.3 Conceptual Framework

The conceptual framework initially developed to guide this study (Figure 3-3) shows how the study aim and its objectives is achieved through the application of qualitative methodology and the application of different theories in making sense of the data and in the creation of knowledge.

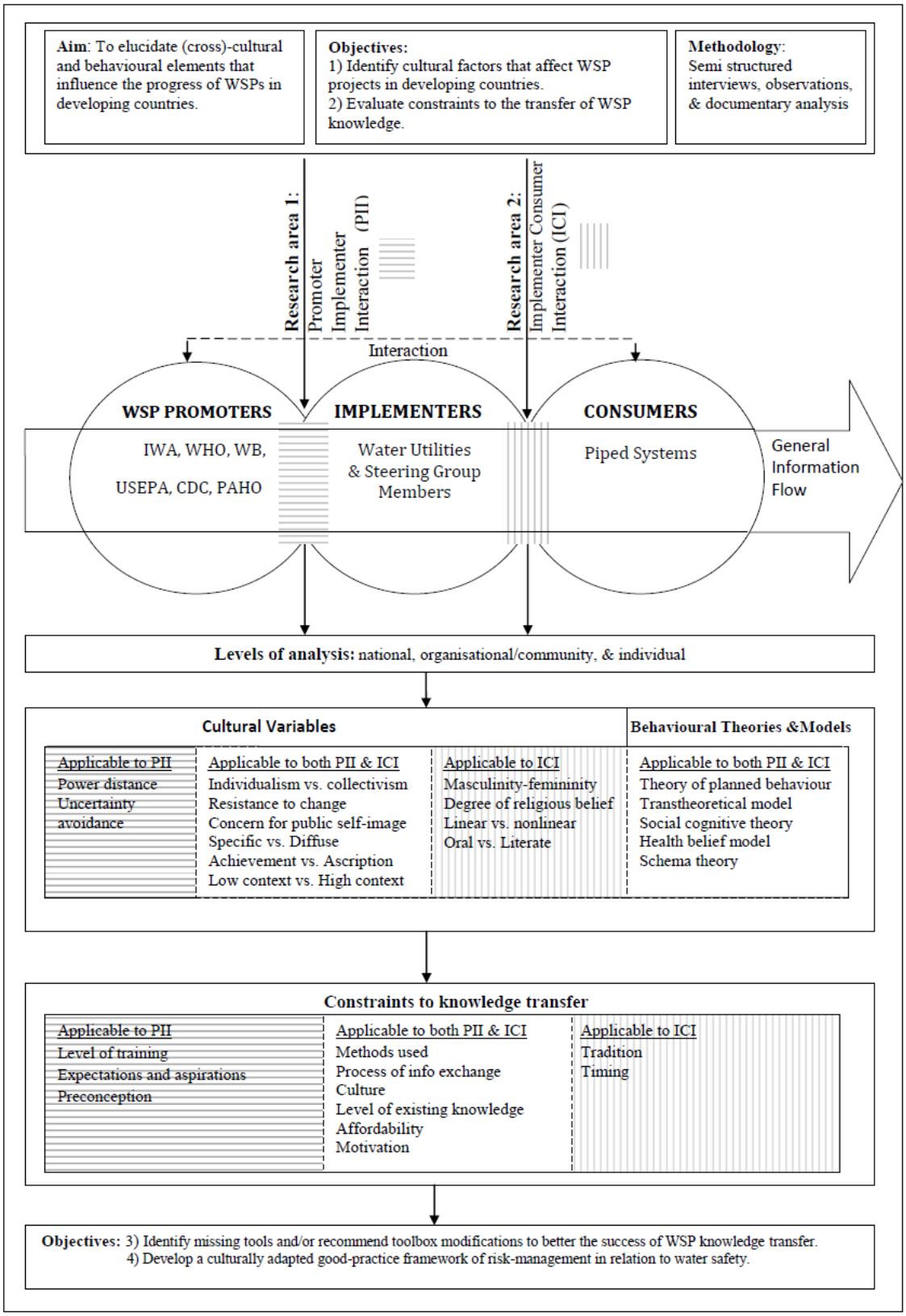

Figure 3-3: Conceptual Framework

3.4 Conclusion

In this chapter I have addressed the philosophical and theoretical issues that have shaped this research. The paradigm of inquiry has been established. The multiparadigm approach taken here, that is combining interpretive and critical paradigms, has provided the context for selecting cultural theories and institutional theory that situate this study. In addition, the paradigm of inquiry contextualizes, the choice of qualitative methodologies in which the case study approach is embraced. In the next chapter details of the methodology adopted for this study will be presented.

4 METHODS

4.1 Introduction

This research employs a case study approach in which semi-structured interviews, observations and document analysis were used to generate qualitative data. This chapter provides a description of: how the case study is designed, the collection of data and its analysis, and how validity and reliability was ensured. The evolution of methodology during the different stages of research is also explained.

4.2 Case Study Design

This research uses a multiple-case design comprising of three cases. Each case is embedded with three units of analysis. Evidence from multiple cases is thought to be more convincing and is "regarded as being more robust" (Yin, 2003). This design is in line with the need to study the implementation of WSPs in various developing countries and at different levels.

Choosing Cases

As suggested by Denscombe (2003), there ought to be justification in the choice of cases. The criteria used for selecting cases included:

- **WSP Experience**. The utility being studied had to have at least a year's experience in WSP implementation;
- **Country's Location**. The country had to be chosen from each one of the three major WSP promotion zones. These zones are Latin America and Caribbean (LAC), Africa, and Asia; and
- **Utility's Capacity**. The chosen utility had to have a piped water system and the capacity to supply a population of at least 200, 000 people.

Initially 10 WSP projects were chosen as the cases to be studied. Out of the 10 cases, three were to be part of field studies and seven as desk studies. For the field studies,

WSP projects in India, Kampala, and Honduras were chosen. Honduras had to be dropped because of a political coup that took place in the country. In its place, a WSP project in Jamaica, also part of the LAC zone, was chosen after consultations with supervisors and sponsors. More than half of the desk case studies chosen were from Latin American countries in order to compensate a lack of field visit to the area. However, because of lack of enough literature on the selected desk studies, a robust desk study could not be conducted and as such the idea of desk studies was abandoned. Nonetheless, information from WSP projects in Latin America has been used to inform this study. So ultimately the research focused on the following three field case studies:

- Hyderabad WSP Project;
- Kampala WSP Project; and
- Spanish Town WSP Project

In this study a replication rather than sampling logic was used. Yin (2009) suggests the selection of cases in such a way that they replicate each other either literally, thus predicting similar results, or theoretically, hence predicting contrasting results for predictable reasons. The criteria used in selecting these cases ensured both literal and theoretical replication thus enhancing data robustness.

Choosing Units of Analysis

After choosing cases, decisions had to be made on the units of analysis. A unit of analysis in a case study can be a person, an event or some other entity other than a single individual (Yin, 2009). Bernard (2006) suggests that data collection should happen at the lowest level unit of analysis possible. Keeping the research objectives in mind, the following three units of analysis were chosen:

- Promoters-organizations that encourage and support the implementation of WSPs

- Implementers- urban water utilities which can either be government owned, semi-private, or private

- Customers- individual water utility clients who have access to piped water systems

4.3 Preparation for Data Collection

Before venturing into the field for data collection the author engaged in several preparatory activities which are described below.

4.3.1 Pilot Interviews

A dozen pilot interviews were conducted to test the research questions and sharpen the interview skills. Engaged for these interviews were five post graduate students from developing countries three of them with work experience in the water sector and seven newly arrived immigrants from developing countries. Specific benefits of these pilot interviews included:

- Reduction and restructuring of interview questions: The initial interview questions were too long and the interviewees felt overwhelmed and tired. A shorter and more concise interview schedule was developed. The sequencing of some questions was also changed.
- Identification of new cultural aspects to focus on: The development of the initial interview questions was guided by literature review, the pilot interviews added the aspect of corruption as an important cultural aspect to be investigated.
- Sharpening of interview skills: For example, listening to the interview tapes the author realized a habit of finishing sentences for interviewees.

4.3.2 Development of Case Study Protocol

A case study protocol was developed for each of the field case studies. Having a case study protocol increases the reliability of a case study and is considered essential when doing a multiple-case study (Yin, 2009). The case study protocol contained the field procedures and the general rules to be followed. It also contained an overview of the research, interviewing guide, interview schedule, case study questions and a guide of the case study report. The case study questions were posed to the investigator and not

the interviewee. These questions, as suggested by Yin (2009), included: questions asked of specific interviewees, questions asked of the individual case, questions asked of patterns of findings, questions asked of the entire study, and normative questions asked about recommendations and conclusions.

4.3.3 Pre-trip Documents Review

Before each field trip the author reviewed information about the research site, the water utility, and the WSP project. This information was received from different sources such as IWA, contacts established at the utility, and the internet. Also as part of preparation the author started looking at online newspapers from the research locales. This helped the author to develop a better understanding of the context.

4.4 Participant Attributes

4.4.1 Customers

Altogether 150 customers participated in this research. As indicated in Table 4-1 the customers were mostly male in Hyderabad (68%) and Kampala (60%) and mainly female in Spanish Town (60%).

Table 4-1: Customer Demographics

Demographic	Hyderabad (n=50)	Kampala (n=50)	Spanish Town (n=50)
Gender			
Male	68%	60%	40%
Female	32%	40%	60%
Age			
<20	2%	2%	Nil
20-29	42%	34%	32%
30-39	30%	32%	26%
40-49	18%	26%	22%
50-59	6%	6%	20%
70-79	2%	nil	Nil
Religion			
Hindu	56%	2%	Nil
Muslim	38%	12%	6%
Christian	2%	80%	86%
Sikh	4%	nil	Nil
Rastafarian	nil	nil	8%
Indigenous	nil	6%	Nil
Education			
Primary	28%	42%	42%
Secondary	30%	26%	36%
College	30%	26%	22%
University	12%	6%	Nil

In all three locations the majority of them were between the ages of 20 and 39 years old. Whilst most of the participants in Hyderabad (56%) believed in Hinduism the overwhelming majority were Christians in Kampala (80%) and Spanish Town (86%). All the customers had completed some level of formal education ranging from primary school to university.

4.4.2 Implementers

32 Implementers ranging from director level managers to technicians participated in this research. Among the implementers (Table 4-2), all of them were male in Hyderabad and most of them (90%) were also male in Kampala. However, in Spanish Town they were mostly (86%) female.

Table 4-2: Implementer Demographics

Demographic	Hyderabad (n=15)	Kampala (n=10)	Spanish Town (n=7)
Gender			
Male	100%	90%	14%
Female	nil	10%	86%
Age			
30-39	20%	40%	43%
40-49	33%	30%	29%
50-59	47%	30%	29%
Religion			
Hindu	93%	nil	nil
Muslim	7%	nil	nil
Christian	nil	100%	100%
Education			
College	13%	10%	29%
University	87%	90%	71%

In terms of religion 93% were Hindu in Hyderabad and all of them were Christians in Kampala and Spanish Town. When it comes to education, the majority of them (87% Hyderabad, 90% Kampala, and 71% Spanish Town) had university level qualifications

4.4.3 Promoters

Out of the nine promoters (Table 4-3) five were from Hyderabad, one from Kampala and three from Spanish Town. Majority of them (80% Hyderabad, 100% Kampala, and 67% Spanish Town) were male. The dominant age group in Hyderabad was the 50-59 years old (47%) and the 40 to 49 years old in Spanish Town (67%). 80% in Hyderabad believed in Hinduism whereas in Kampala and Spanish Town they were all Christians. All the promoters had university level education

Table 4-3: Promoters Demographics

Demographic	Hyderabad (n=5)	Kampala (n=1)	Spanish Town (n=3)
Gender			
Male	80%	nil	33%
Female	20%	100%	67%
Age			
30-39	20%	nil	33%
40-49	33%	nil	67%
50-59	47%	100%	Nil
Religion			
Hindu	80%	nil	Nil
Muslim	nil	nil	Nil
Christian	20%	100%	100%
Education			
University	100%	100%	100%

4.5 Data Collection

Data for this research was collected through semi-structured interviews, observations, and documentary analysis. The duration of field work was six weeks in Hyderabad and five weeks each in Kampala and Spanish Town. All collected data was stored in labelled folders in a laptop using Windows Vista as part of the case study database. Systematic labelling of files and folders was used to facilitate ease of retrieval. To avoid the risk of losing data, multiple copies of all collected data were made and stored in external storage devices. Microsoft Word was used to type and store all field notes including descriptions of observations and conversations. Details on the use of these qualitative data collection techniques are provided below.

4.5.1 Semi-Structured Interviews

The interview process was guided by the interview guide (Appendix A). For example, the interviews followed Robson's (2001) recommended order, that is, introduction, warm-up, main body, cool-off and closure. During introductions, the interviewees were informed of the interview's purpose and consent was sought for recording the conversations. Other techniques described in the guide, such as probing, were also followed during the interviews.

Pre-prepared questions constructed around main themes identified through literature review and pilot interviews were used in the interviews (Appendix B). The interviews were focused, open-ended and conversational in manner. The author found that maintaining a balance between focus and open-endedness was important in the flow and quality of data.

Different non-probability sampling strategies were used to make decisions on whom to interview and how to find the interviewees. For example, purposive sampling was used for promoters and implementers while haphazard sampling was used for customers. The network structure of IWA was used to set up interviews with some of the promoters and implementers.

In order to get robust data, high, middle and low ranking members of each unit of analysis were interviewed. For example, among the utilities information was sought from director level managers, branch managers and junior staff. Among the customers, individuals from different social-classes, inferred from neighbourhoods, were interviewed. All interviews were conducted in English.

As advised by Wengraf (2001), the author took consideration of the social settings, that is, factors such as local physical and social arrangement, type of day, time of day and social constraints and interruptions. These considerations were of particular importance when dealing with people who had different cultural values.

Interviews held with customers and implementers were held in private spaces. While there were some interruptions, the interruptions themselves were revealing in some ways. The private surroundings also offered many clues. Interviews held with promoters were held in neutral spaces. These spaces were mostly hotels in which workshops or meetings were being held.

During the interviews a digital voice recorder was used to record the interviews and interview notes were also taken. Labelling of the recordings with date, time, place and informant was an important first step. Separate file for each interview was created and enough data on the interviewee was saved to enable re-contact.

While all interviews with implementers and promoters were recorded, there were three instances where customers would not give consent for recording their interviews and as such their responses were written down[2]. Immediately after each interview the author took some time to reflect and make notes recording thoughts and observations. This "'instant post-interview debriefing'" is important because during the interview, taking of excessive notes might lead to breaking contact and rapport with the informants (Wengraf, 2001).

Digitally recorded interviews were transcribed verbatim by the author using Microsoft Word. An alphanumeric code is used to identify each interview. The first letter refers to the case locale; Hyderabad (H), Kampala (K) and Spanish Town (S). The second and third letters indicate the type of the interview: CI, II, and PI indicate customer interview, implementer interview, and promoter interview respectively. The number shows the interview number. For example, the code HCI15 means Hyderabad customer interview number 15.

One of the lessons learnt regarding interviews is that as much as you put an effort in shaping the interview process, the moods and the personality of the interviewee also have an equal or heavier weighting on the matter.

4.5.2 Observations

Observations made in the field make an important contribution to the data on which this research is built. Observations began upon setting foot in each field location and ended after leaving. The author used both covert and overt observation techniques. In some instances the author made conversations and asked questions about the observations. These observations and conversations were recorded in the field notebook.

A digital camera was also used to take pictures and video clips of some observations. In instances where it was not possible to take pictures the author would record the observation in his field notebook. For example, in Jamaica the author was told by

[2] A customer in Spanish Town explained that she did not want her voice to be recorded because it could be used to bewitch her

informant that it was dangerous to take pictures in some areas of Spanish Town because there were many drug dealers who would think they were being spied on

I found pictures and video clips to be very effective in illustrating the observed activity particularly during presentations.

4.5.3 Documentary Analysis

A variety of documents were analysed to source data. Of vital importance were primary documents directly linked to the subject of study, examples include: WSP project reports, internal utility reports and documents, and other stakeholder reports such as regulatory reports.

Data was also obtained from consultations with key stakeholders. Based on a list created from preliminary literature review, key people who have been involved in the implementation of WSPs were consulted. Through such consultation unpublished items and personal insights into different WSP projects were received.

Publicly available information such as reports from development organizations and media reports were also used. I bought two to three different local newspapers every day in order to be up to date with local developments and issues of interest to the research.

4.6 Data Analysis

Thematic analysis was used in analysing the collected data. The adopted approach combined various techniques used in qualitative data analysis and analysis of case studies.

Raw data from each case were organized into themes developed to analyze the data. This process, referred to as coding (Neuman, 2003), initially entailed locating themes in each data set and assigning codes to condense the data, that is open coding (Strauss, 1987). For example, data from interviews in which cultural uses of water were being described, would be stored under the theme cultural uses of water. This data would then

be linked to data from observations and documents reviews related to the same theme within the case.

Comparison of themes from each case was conducted after the addition of the second and third cases. After thorough and painstakingly slow analysis within each case and comparison between cases, recurrent themes found in all the cases were identified.

These themes were then analysed to find different explanations, connections, and differences. This iterative process of collating, grouping and examining qualitative evidence led to the development of a theoretical framework.

4.7 Validity & Reliability

Robson (2006) mentions three areas in which the validity of a research can be threatened and how the threats can be resolved:

- **Description**- Threat to provide valid description of what has been seen or heard. This can be resolved by using recordings. I have audio recordings of interviews and, picture and video recordings of many observations.
- **Interpretation**– To ensure validity, the researcher must be able and prepared to trace the route that leads to an interpretation. The chains of processes that lead to my interpretations are presented within the thesis.
- **Theory**-Interference of researcher's presence with study setting and people's behaviour. Need to address both the researcher and the respondent's biases. I kept on guard against my biases. As far as respondents were concerned, interview techniques (Appendix A) were used to minimize their bias. Sometimes I engaged in covert observations to minimize interference.

In order to ensure case study reliability and validity, Yin (2003) suggests using construct validity, internal validity, and external validity tests in addition to a reliability test. These tests and the tactics used during the different phases of this study are shown in Table 4-1.

Table 4-4: Case Study Validity & Reliability (Yin, 2009)

Tests	Tactics	Phase
Construct Validity	use multiple sources of evidence	data collection
	establish chain of evidence	data collection
	have informants review draft case study report	composition
Internal Validity	do pattern matching	data analysis
	do explanation building	data analysis
	adress rival explanations	data analysis
	use logic models	
External Validity	use theory in single-case studies	research design
	use replication logic in multiple case studies	research design
Reliability	use case study protocols	data collection
	develop case study database	data collection

Triangulation is done using different sources of evidence. In case studies the usage of a single source of evidence is not recommended (Yin, 2003). The following sources of evidence were used to corroborate one another: Semi-structured interviews, observations and documentary data. Denzin (1998) mentions four types of triangulation:

- Data triangulation: Involves using more than one data collection method
- Theory triangulation: Use of several perspectives or theories
- Methodological triangulation: The use of both quantitative and qualitative approaches
- Observer triangulation: Having more than one observer in the study

To enhance this study's rigour, data triangulation and theory triangulation were conducted. In addition to triangulation, 3 other techniques recommended by Robson (2001) to ensure validity were used:

- Member checking: Communicating with informants and double-checking transcript accounts and interpretation with them. If it was not physically possible, communication was done through telephone or email.
- Negative case analysis: 'Playing the devil's advocate' by devoting time and attention to search for instances which ruled out the ideas that are being developed.
- Audit trail: Keeping full activity records including raw data from interviews and field notes, research journal and details of coding and data analysis.

When it comes to reliability, Robson (2001) recommends that researchers using flexible designs ought to be thorough, careful, and honest. He emphasizes the importance of maintaining an audit trail as a proof.

4.8 Ethical Considerations

This research followed Cranfield University's Ethics Policy.

4.9 Conclusion

In this chapter I have explained the methodology used in conducting this study. The choice of a multiple case design and its various components has been described. The process through which data was collected and analysed has also been explained. In the next three chapters the findings from each case will be presented.

5 HYDERABAD CASE

5.1 Introduction

This chapter presents findings from semi-structured interviews, field observations and document reviews on the Hyderabad WSP pilot project. The presentation of the findings begins with a description of the location and its people taking into account aspects such as their culture and perceptions of water safety. This is followed by a brief account of the areas' water utility and details on the water supply system. After this, a full description of the WSP project is provided covering aspects such as how the idea came about to suggestions on ensuring its success. The last sections of the chapter revisit the water utility and examine the internal workings of the organization and the challenges it faces.

5.2 Location and People

Hyderabad, the capital of Andhra Pradesh State, is located on the Deccan plateau of the Indian subcontinent. The Hyderabad urban agglomeration (HUA) covers an area of 778 km^2 consisting of the Municipal Corporation of Hyderabad (MCH), Secunderabad cantonment, Osmania University, ten surrounding municipal towns, some out growths and a few smaller settlements (Ramachandraiah and Vedakumar, 2007). In 2007 much of the area under HUA was constituted into the Greater Hyderabad Municipal Corporation (GHMC). This area is one of the fastest growing urban areas in India and is ranked as the sixth largest city.

The city has a long cultural history going back to the rule of the Nizam. Like many other historical cities, Hyderabad's history is also intertwined with water. It was water scarcity in Golconda, the seat of the Qutub Shahis dynasty that led to the creation of Hyderabad along the banks of the Musi River by Sultan Muhammad Quli Qutb Shah in 1591 (Nayeem, 2002). Historically, Hyderabad was recognized for the civic amenities it provided for its citizens (Ramavat, 2010). Located in a semi-arid region, the city's water needs were met through wells, tanks and lakes (Ramachandraiah and Prasad,

2004). Both natural and man-made water bodies have been an inalienable part of its urban ecology (Ramachandraiah and Vedakumar, 2007). In addition to covering domestic uses, these water bodies, locally referred to as Cheruvus and Kuntas, also acted as storage reservoirs for irrigation and provided ground water recharge.

Figure 5-1: Map of India (Worldatlas, 2008)

Hyderabad and its environs are part of the Krishna and Godavari river basins River Musi, a tributary of Krishna River, runs through Hyderabad and divides it into its older northern part and newer southern part. While the Esi is a tributary of River Musi, and Manjira is a tributary of Godavari River. Hyderabad is a multicultural city which has elements of both North and South India to which it represents a meeting point. In recent years the city has seen a high inflow of information technology (IT) companies. Elements of both tradition and development are clearly visible in the city's cultural melange of IT, Hindu, Telugu and Islamic cultures.

Unfortunately, over the years the city's water condition has deteriorated. The River that once attracted the city's founders today flows with a gruel of sewage and waste water.

Unabated pollution from untreated domestic sewage and toxic industrial effluents have rendered several of Hyderabad's lakes, identified as potential sources of drinking water, unusable (Ramachandraiah and Prasad 2004). In 2002 18 of Hyderabad's 87 lakes were found to be highly polluted and by 2004 the number had grown to 42 (Kunz, 2007). Out of River Musi's 256 km length, the 28 km section that passes through Hyderabad is described as the most severely polluted section of the river (Ramavat, 2010).

Figure 5-2 Symbols of old and New Hyderabad Charminar on Left and IT City on the right (Author, 2008)

Hyderabad has inadequate sewerage treatment capacity and only 23 % of the generated sewerage is treated (Ramavat, 2010). As a result the untreated sewerage is discharged into water bodies, mostly River Musi, and several open drains passing through the city. Residential areas with no sewage treatment and disposal system face high contamination risks.

India has a large urban population estimated at around 290 million (Shaban, 2008). Growth in urban population is driven by both natural growth and rural urban migration mostly resulting from livelihood search. Hyderabad has seen a rapid growth in its population over the past several decades. The decadal growth rates for Hyderabad during the seventies and eighties were 43% and 67% respectively (Ramachandraiah and

Prasad 2004). Although the overall growth in the nineties decreased to 31%, the surrounding municipalities had a growth rate of 71%. Compared to its 1961 population of 1.25 million (Ramachandraiah and Prasad 2004) Hyderabad's projected population for 2011 is 9.1 million (Ramavat, 2010). The city's population for 1961, 1981, and 2001 has been 2.25 million, 4.3 million, and 5.5 million respectively (Ramachandraiah and Prasad, 2004)

Hyderabad has also experienced a high rate of urban sprawl, the areal expansion of cities, also referring to the pace and magnitude of land conversion to urban use. Between 1973 and 1996, the built-up area of Hyderabad city increased from 245 km^2 to 587 km^2 (Ramachandraiah and Prasad 2004). The urban sprawl in Hyderabad has led to the encroachment of vacant land and water bodies further disrupting the city's intricate water balance. Reduced recharge levels, lowering of the water table and floods have been linked to this encroachment.

Due to increasing population and slow expansion of service coverage many people are resorting to groundwater usage. Increasing number of bore wells and the decline of groundwater table has resulted in the bore wells now being dug up to over 800-1000 feet in several areas as many old bore wells are drying up. Loss of water bodies and decline in the city's water table has led to undertaking of "long-distance and expensive water projects" to cater to the city's water needs (Ramachandriah and Vedakumar, 2007).

5.2.1 Description of Culture

In describing their culture, participants in Hyderabad used different and varying conceptions. As their first descriptor, 56% used their ethnicity, 30% their nationality, and 14% their religion. Examples of their responses include: "My culture is Telugu", *"I am Hindu"*, *"My culture is Indian"*, *"I can say Hyderabadi"*, *"The culture I have is Muslim"*. When asked if there was any other way they would describe their culture, 44% used their ethnicity, 26% their nationality, 24% their religion, and 6% their locality.

5.2.2 Cultural Perceptions and Uses of Water

In explaining how water was seen in their culture 80% of the customers in Hyderabad used religious references, the participants used language rich in symbolism and mythology. There comments included:

"Our water comes from the Krishna River which is a Holy river. We believe this river comes from the mouth of a cow statue in a sacred temple. This river is Lord Vishnu himself. When people wash themselves in Krishna River, they become pure and all their sins are gone" (HCI9).

"In our culture water is very important because we believe water is important for life both physically and spiritually. Life is physical and spiritual; we use water to stay alive in both ways... Spiritually water makes you pure and it destroys evil" (HCI30).

"We believe that all life comes from water, this is what the Quran says" (HCI1).

"Before water there was no life and if there is no water there will be no life" (HCI37).

*"Water makes you clean both physically and spiritually" (*HCI50).

"We have to use water for Ghusul, that is complete body wash for example after sleeping with your wife or after women have their monthly periods. We also have to perform ablution before every prayer" (HCI7).

"Water washes away your sins" (HCI21).

"Water cleanses humans from their sins" (HCI19).

"Water is part of all the religious rituals we do in Hinduism, from birth to death" (HCI13)

My field research in Hyderabad coincided with the annual 11 day Ganesh festival celebrated to mark the birthday of the revered elephant headed Hindu god, Lord Ganesh. Hyderabad hosts one of the largest Ganesh festivals in India. During the first ten days of the festival idols of various sizes shapes and forms were displayed in decorated temporary structures in local neighbourhoods (Figure 5-3). People celebrated

through prayers, dancing, chanting and making of monetary contributions. On the 11th day, a colourful and festive procession escorting the idols passed through the city streets. Individuals, lorries, trawlers, and trucks carrying Ganesh and other idols (Figure 5-3) proceeded to the city's Hussain Sagar Lake for immersion. Several cranes were used to offload and immerse the gigantic idols into the lake.

Figure 5-3: On the left is Lord Ganesh on display in a local neighbourhood and on the right is his father, the deity Shiva, en route to immersion during the 2008 Ganesh festival in Hyderabad (Author, 2008)

This important Hindu tradition was celebrated by men, women, and children from different religious and social backgrounds. In the midst of this vibrant and moving festivity, I asked an official at a local government stand about the environmental effect of the immersion. He explained: "*This is not permanent, we will clean out all the statues after the festival is finished, now is time to celebrate, not to worry.* A local environmental activist explaining the effects of the Ganesh festival pointed out:

"The way people are conducting these festivals is not part of the traditions. Normally the idols were made from clay and natural colours were used. People are using plaster of Paris and they are using paints full of chemicals. These festivals used to be a family affair and a religious ritual, now it is all business. People make very big idols and they get contributions from people who come to visit during the ten days of display. Water is supposed to be holy, religious practices should not be used to pollute the water (HCI48).

A recent study on the lake's water and sediments indicates high mercury concentrations which can be attributed to the artificial paints on the idols immersed in the lake (Suneela et al, 2008). Other researchers also associate elevated mercury levels in the lake may be the result of the cultural activities of the Ganesh festival (e.g. Rao et al, 2004). Several other studies also indicate idol immersions during the Ganesh festival is a major sources of pollution in water bodies (e.g. Vyas et al, 2006; Dixit and Tewari, 2007; Pradhan and Latkar, 2008). In addition to a growing trend towards bigger and bigger idols, the idols are nowadays made of plaster of Paris which contains gypsum, sulphur, phosphorus, calcium and magnesium while the paints used contain toxic compounds such as lead, mercury and cadmium (Pradhan and Latkar, 2008)

Near the lake where the immersion of the idols took place two adjacent water camps were set up, one by the water utility and the other by the local government, to provide the public with clean drinking water. Both organisations had set up tables behind which they dispensed water from large drums.

Figure 5-4: Local authority Water Camp (Author, 2008)

The local authority used hand held jars to fetch the water from the drums and poured them into cups which were shared by all those who came to drink water. Some individuals used the same cups to wash their faces and rinse their mouths Figure 5-4.

At the water utility table, water was offered using one time use plastic cups and there was no sharing of cups, a clear improvement on the practice by the local authority. However, there was a downside to how they offered the water. Instead of using jars or tumblers to fetch water from the drums, the utility staff dipped the hand held cups directly into the drums (Figure 5-5). Clearly this indicates contamination risks. Another common practice which I observed in Hyderabad was individuals walking into a restaurant, grabbing the water jar on the table, drinking from it and then walking out.

Figure 5-5: HMWSSB's Water Camp

I made several visits to places of worship to witness the interaction between the worshippers and water. An important observation was made during a visit to a local mosque in the city's Mehdipatnam area. I saw an elder asking people to reduce the water flow on the taps that they were using for pre-prayer ablution referred to as *wudhu*.

He explained to them that they were wasting a lot of water and that it was forbidden to waste water. I interviewed the elder later and he thus explained:

The prophet used to use around half a litre of water for Wudhu. Nowadays we have taps in the masjid and it is not like before in the olden days where people used water from a pond or a container. Instead of using half a litre, people open the taps all the way and use a lot of water. Some of them would be talking to their friends while the tap is running, this is not good. People come to the masjid for five prayers, now five times a day wasting all that water is not good. Wasting water is not allowed in Islam. This also makes the water bills very high. (ICI30)

Following this revelation I conducted a quantitative assessment of ablution water use at the mosque which showed usage of up to nine litres and an average of five litres. The details of this assessment are shown in appendix C.

When asked how paying for water was viewed in their culture, nearly all of the participants indicated that in their culture water was considered to be something that should not be charged for. Some of their comments include: *"Those who have water should share it with those who don't have, water is not supposed to be sold"* (ICI8). *"Water is God's blessing for humanity"* (ICI35). *"Water is from rivers, lakes and wells; it comes naturally so it should be free"* (ICI50).

Expressing this conviction was stronger in some customers. One such customer set up a drinking water dispenser outside his gate in order to share water with others (Figure 5-6). This individual based his action on the belief that sharing water with a thirsty person is a virtue that will be rewarded by God.

Figure 5-6: A drinking water dispenser for sharing water with others in Hyderabad (Author, 2008)

5.2.3 Water Safety Perception and Storage Related Practices

When asked how they judged if their water was safe and good to drink, customers mentioned aesthetic aspects such as colour, smell, and taste. Some of them included previous experience with the water. Examples of Customer comments include:

Safe water has no colour (HCI33)

Safe water looks clean (HCI46)

When water is good to drink is does not have a smell (HCI5)

Good water tastes nice (HCI24)

I think you judge by experience, if somebody in your family becomes sick from drinking the water, then you have to filter the water before drinking (HCI20)

All the customers indicated they stored their drinking water using different types of containers such as pots, jerry cans, drums and buckets. 90% of the households indicated they covered their containers. 65% had a designated utensil for fetching the water.

However, on several occasions I observed individuals dipping hand held cups into the storage containers. 55% of customers felt that it was safe to drink the water without any supplementary treatment. However, when asked if they treated their water before drinking 70% of the customers indicated they did. The most common treatment method was filtration 80%, then boiling 15% and chlorine 5%. In 5% of the households there were visible excreta in the premises. Hyderabad WSP pilot linked research found "Contamination of stored water samples significantly higher than source sample indicating intra-household contamination." and "low awareness regarding hand washing" (George et al., 2007). A WSP promoter in Hyderabad pointed out that "Many at times pollution takes place due to mishandling of water at the household level" (HPI1).

5.3 Water Supplier

Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) is responsible for the provision of potable water and sewerage facilities in Hyderabad. This statutory organisation was constituted under the provisions of Hyderabad Metropolitan Water Supply and Sewerage Act of 1989 which consolidated the Public Health Engineering Department formerly responsible for water supply, and the Municipal Corporation of Hyderabad (MCH) which was in charge of sewerage services. Under the Act, HMWSSB is considered to be an 'autonomous' body responsible for supply of potable water including planning, design, construction, implementation, maintenance, operation & management of water supply and sewerage system.

As shown in Table 5-1, HMWSSB is chaired by the state's Chief Minister who has the Minister for Municipal Administration & Urban Development as his deputy. In addition, HMWSSB's Managing Director (MD), departmental directors, and other government officials are also members of the board. The Board's chairman oversees all important and politically sensitive policy decisions, such as tariff rates, and leaves the operations of the Board to the Managing Director (Davis and Tanka, 2006).

Table 5-1: HMWSSB's Board Members (HMWSSB, 2008)

Board Member	Position
Honourable Chief Minister of Andhra Pradesh (AP)	Chairman
Honourable Minister for Municipal Administration & Urban development	Vice Chairman
Chairman AP Pollution Control Board	Ex–Officio Director
Principal Secretary, Municipal Admin & Urban Dev. Govt. of AP	Ex–Officio Director
Secretary Finance (IF) Govt. of AP	Ex–Officio Director
Special Officer & Commissioner, Municipal Corporation of Hyderabad	Ex–Officio Director
Director, Health, Govt. of AP	Ex–Officio Director
Director (Technical), HMWSSB	Director
Director (Finance), HMWSSB	Director
Managing Director, HMWSSB	Managing Director

The current HMWSSB formation was encouraged by the World Bank as a means of creating an authority with greater financial and operational autonomy, as well as heightened accountability to customers (Davis and Tanka, 2006.). The expectation was that the Board would attain cost recovery and free itself from political interference. Nonetheless, the board enjoys neither budgetary nor personnel management autonomy. The State government retained ownership of the Board's assets and all members of the Board of Directors are political appointees. In addition, some of the staff are still employees of the state Public Health Engineering Department and are subjected to its personnel management policies in areas such as promotion, transfer and benefits (Davis, 2005). Financial autonomy is largely obstructed by low rates of fee collections and as such, the Board has become highly dependent on – and controlled by – the State government (Celio, 2007). Operationally the organization is headed by a Managing Director as shown in Figure 5-7

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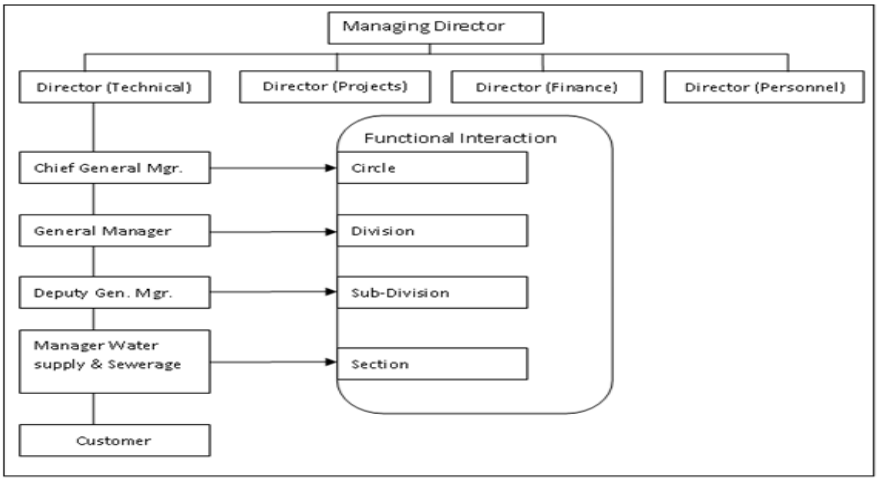

Figure 5-7: HMWSSB's Organizational Chart

The Board's mission is: "to improve the Hyderabad city environment for enhanced health and quality of life through safe and adequate water supply at affordable price." Its vision is**:** "to provide water of the highest quality round the clock for all the people with the aim of building a better tomorrow." The mission and vision statements of the Board are prominently displayed even the outside walls of the Board's different business premises as shown in Figure 5-8.

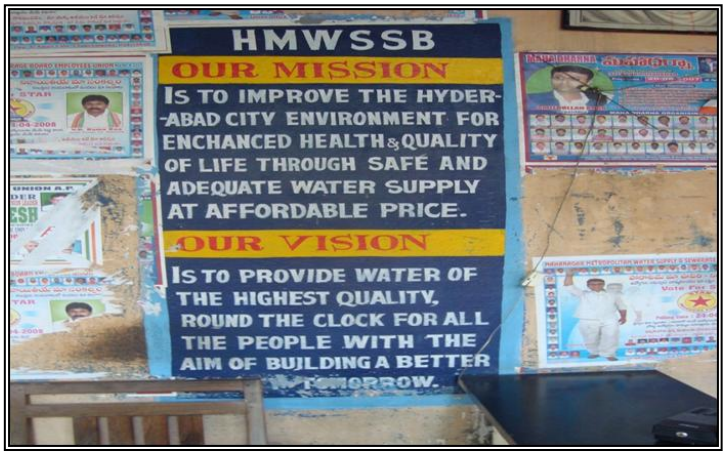

Figure 5-8: HMWSSB's Mission and Vision Statements
(Author, 2008)

5.4 Water Supply System

The state of the Board's infrastructure has contributed to Hyderabad's water woes which have been mounting over the years (Ramavat, 2010). The current storage capacity is considered to be inadequate to meet GHMC's water demands. In addition to the lack of holding capacity of the reservoirs, the distribution infrastructure is also limited. However several projects are being undertaken to address this situation. For example, under the Jawaharlal Nehru National Urban Renewal Mission (JnNURM) several reservoirs are being built. Below is a description of the water supply system including water sources, treatment processes and distribution.

5.4.1 Water Sources

In its early days Hyderabad used to rely on water impounded in tanks and shallow dug wells (Celio, 2007). The Husseinsagar and Mir Alam Tank, built in 1562 and 1908 respectively, supplied the city's drinking water till about 1930 (Ramachandriah and Manikonda, 2007). These tanks also provided protection against floods. Currently, Hyderabad relies on four main surface water sources: Osmansagar, Himayatsagar, Manjira Barrage, Singur Dam and Nagarjun Sagar Dam, originally built in 1966 for irrigation purposes (Table 5-2).

Table 5-2: Hyderabad's main Water Supply Sources (GHMC, 2008; HMWSSB, 2008)

Source Name	River	Year	Impoundment Name	Distance from city (Km)	Capacity (Mgd)	Supply Mode
Osmansagar	Musi	1920	Osmansagar	15	25	Gravity
Himayatsagar	Esi	1927	Himayatsagar	9.6	20	Gravity
Manjira-Phase I	Manjira	1965	Manjira Barrage	58	15	Gravity & pumping
Manjira-Phase II	Manjira	1981	Manjira Barrage	59	30	Gravity & pumping
Manjira-Phase III	Manjira	1991	Singur Dam	80	75	Gravity & Pumping
Manjira-Phase IV	Manjira	1993	Singur Dam	80		
Krishna Phase I & II	Krishna	2004/05	Nagarjun Sagar Dam	116	150	Pumping & gravity

Population growth in Indian cities has accelerated the appropriation of water resources traditionally meant for 'subsistence' in rural areas (Shaban, 2008). In Hyderabad, HMWSSB lacks full control of water supply to Hyderabad from the Nagarjunasagar on the Krishna River, and Singur on the Manjira River (Celio, 2007). The Irrigation Department is in charge of these sources and as such the set-up is at odds with the Board's mandate of control over the water supply infrastructure. HMWSSB's attempt to gain control over Singur has faced stiff opposition from the Irrigation Department.

Over the years Hyderabad has been sourcing its drinking water from further and further distances (Table 5-2). Such sourcing has not been a straight forward matter and has been engulfed in regional and party politics (Celio, 2007). The State of AP is divided into three regions: Telangana in the North, Rayalseema in the South and Coastal Andhra. The historical reasons that created these divisions have also influenced current political discourse which often proceeds along regional fault lines. Farmers and politicians from the drought-prone Rayalseema region have been opposing the reallocation of Krishna water to Hyderabad on regional consideration grounds. Their argument has been that before any reallocations for Hyderabad (located in Telengana) projects sanctioned for Krishna water diversion to Rayalseema, but never implemented, had to be completed first. Members of the Legislative Assembly (MLAs) belonging to the Indian National Congress (INC) staged protracted hunger strikes in opposition to such diversion. This political impasse lasted till 2003 when the AP government took the decision to implement the Krishna Drinking Water Project following a major drought that brought Hyderabad to the brink of a major water crisis (Celio 2007).

5.4.2 Water Treatment

Hyderabad's water goes through conventional treatment followed by disinfection at the sources identified in Table 5-2. For example, water from Nagarjun Sagar is treated at the Kodandapur Water Treatment Plant which is comprised of two treatment plants. At this plant raw water goes through aeration, pre-chlorination, alum dosing by flash mixing, flocculation and sedimentation, rapid gravity sand filtration and post-chlorination. The operation and maintenance of this plant has been outsourced to a third party.

5.4.3 Water Distribution

Hyderabad's total service area for water distribution is 688.2 km^2 out of which 169.3 km^2 is the core city (HMWSSB, 2008). Through the transmission mains (286 kms) water is carried from the source to the treatment plants and then towards the master balancing reservoirs at Hydernagar, Lingampally, and Singapur. Afterwards, the trunk distribution mains (265 km) transmit the water to reservoirs within the city. The whole distribution system is 1727 km, consisting of pipes made from different materials and ranging from 75 mm to 700 mm in diameter.

The Board caters to the drinking water needs of an estimated 6.5 million people (NEERI, 2009). Access to piped water supply in the city core is estimated at 70% while for the surrounding areas it averages around 43%. Average per capita consumption is estimated at 162 lpcd but considered to be much lower in slum areas. There are 8353 public stand posts supplying water to lower income households that cannot afford individual connections.

The Board's present supply stands at 334 MGD compared to an actual demand of 425 MGD (Ramavat, 2010). Twenty four hours supply of tap water remains a dream for a majority of households in large Indian cities where about 18% of total households get such service (Shaban, 2008). Hyderabad is at best providing its citizens water for 90 minutes every day or even every alternate day in many areas (Ramavat, 2010). Almost 90% of the population indicate receiving water once in two days (Table 5-3).

Table 5-3: Tap Water availability in Hyderabad (Shaban, 2008)

Availability	Respondents (%)
24 hours	0.3
Few hours once a day	7.0
Once in two days	88.9
Unpredictable	2.0
Can not say	1.8

Intermittent water supply has forced many households to resort to various water sources (Table 5-4). Almost 42% of the population indicate using well water. The amount of water abstracted through bore wells is estimated at 25 mgd in Hyderabad.

Table 5-4: Different Water Sources for Hyderabad Households
(Shaban, 2008)

Water Source	% Use
Municipal tap water	99.7
Private tube well/hand pump	41.8
Packaged Mineral water	0.5
Tap water only	39.7
Municipal Tanker	54.4

In dealing with supply problems HMWSSB officials indicated *"We have 5 sources of water supply, the population is increasing we need to increase our supply, there is encroachment around the source and this is difficult to control"* (HII15). "*We are planning 24 hours supply in the future that means we have to do so many remodelling of lines to meet the 24 hours supply system*" (HII10). The expansion of the service area: "*Taking over of municipalities means increase in engineering, field staff, their systems are totally different, we have to upgrade all municipalities, lots of revenue attachments, lots of consumers"* (HII10). The need for managing demand was also mentioned *"We are proving the 24 hours supply but it is very important that people reduce the consumption of water, avoiding wastage*" (HII3).

Shaban (2008) indicates that in most Indian cities the quantity of water consumed is not determined by the demand, but rather by the supply. Residents have learnt to adjust to both the quantity and quality of water supplied. Ramavat (2010) considers this contentment as a fundamental roadblock to the Board's vision of round the clock water supply and argues that it comes from deep within the psyche of the people who envision such service as something impossibly out of reach. "As long as there is water supply for some time even on alternate days, people seem to be satisfied" (Ramavat, 2010). "This is mainly because they have delimited their aspiration and requirements of water in relation to available supply from the concerned municipalities or water authorities" (Shaban, 2008). Ramavat (2010) also notes "A similar lack of drive has been reflected in the political vision of the state government all these years, with a larger focus on source augmentation rather than effective water distribution".

5.5 WSP Project

5.5.1 Drivers and Description

Hyderabad was selected as a WSP pilot site after being toured by USEPA officials who were looking for a pilot city in the region. This selection was preceded by consultations between the WHO, USEPA, and the Government of India. Hyderabad has been having frequent outbreak of waterborne diseases since 2004. The main reason for which the city was selected was the willingness on the part of the city's Board to undergo through the process. The demonstration project started in 2007 under the management of National Environmental Engineering Research Institute (NEERI). Three different service sections, Adikmet, Moin Bagh, and Serillingampally, were chosen as pilot areas.

The Adikmet area widely referred to as Adikmet 24X7, was chosen because of its 24X7 water supply and its system being comparatively new. Although Adikmet is widely known as a 24X7 supply area, 80% of the interviewed residents indicated not having round the clock water supply. Some of this area's features are shown in Table 5-5.

Table 5-5: Feature of Adikmet Project Area (WHO, 2008)

Adikmet: Project area I	
Geographical Area	3.75 km^2
Population	55,000
Number of connections	4, 833 (1,800 slum areas)
Number of borewells	78
Capacity of the reservoir	1.2 MG
Present supply	2.3 MG
Litres per capita per day (LPCD)	160
Man power	1 manager, 3 linemen
Source of supply	Krishna Water (Nagarjunasagar Dam)
24 X 7 water supply	Introduced in 2006

Serilingampally is one of Hyderabad's surrounding municipalities. It was chosen because its use of bulk water supplied by HMWSSB and distributed by the local government. In this area they were running treated water and borewell water on the same pipes. The features of this pilot area are shown in Table 5-6.

Table 5-6: Features of Serillingampally WSP Project Area (WHO, 2007)

Serilingampally: Project area II	
Geographical Area	101.9 km^2
Population	300,000
Number of connections	7,154 (1000 slum area)
Number of borewells	Power-168, Hand-513
Capacity of the reservoir	0.24 MG
Present supply	2.8 MG
Litres per capita per day (LPCD)	80
Man power	1 Assistant Engineer & 5 linesmen
Source of supply	Manjira water (Singur Dam) & borewells at different timings
water supply	alternative day supply

Moin Bagh, located in the old city was chosen for its slum like conditions, around 70% of the area residents are considered to be of low income. In addition to intermittent water supply the area has narrow lane spaces between buildings. In some places these lanes are 4 feet wide and through them pass the water supply, drainage, sewerage and communication lanes. Table 5-7 shows some of the area's features.

Table 5-7: Features of Moin Bagh WSP Project Area (WHO, 2007)

Moin Bagh: Project area III	
Geographical Area	3.90 km^2
Population	90, 000
Number of connections	7,700
Number of borewells	Power-15, Hand pump-60
Capacity of the reservoir	4.5 MGD (Balapur)
Present supply	4.5 MGD
Litres per capita per day (LPCD)	150
Man power	1 manager, 5 linemen
Source of supply	Krishna (Nagarjunasagar Dam)
Water supply	Alternative day

Source (WHO, 2007)

The steering committee comprised of individuals from HMWSSB, ASCI, IHS, Serilingampally Municipality, and Naandi, a local NGO.

In Hyderabad support for WSP was seen among the top organizational leadership. The MD was aware of the WSP process and what its objectives were. He was present at a WSP workshop and was one of the presenters.

Among middle managers the responses were mixed and included enthusiasm and dismissal. Enthusiasm was shown by members of the quality control team. A manager in one of the pilot areas was dismissive of the process indicating *"WSP is nothing but fixing leaks, we have many years of experience and we know the system inside out"* (HII6).

5.5.2 Development

The development of the Hyderabad WSP was mainly carried out by NEERI with some involvement from HMWSSB. Managers from the pilot locations indicated minimum involvement in the process. It was pointed out that they had not received any WSP related training and that the surveys were carried out by a consultancy company. Some of the comments include: "*This WSP came through NEERI they identified some problems and we work under them*" (HII3). "*There was no specific training on WSP, only NEERI investigated the problem* (HII3). *We don't have any information; whatever we got, we got from NEERI. Detailed surveys were done by a consultancy company"* (HII3). They felt that they would have benefited from some training and exposure to other WSPs, "*Training is good for internal matters; we require training for this project and it will be good to get other practical examples of how they do it*" (HII8).

5.5.3 Awareness and Understanding

Although the organization's top leadership was aware of and supported WSPs, some of the middle and junior managers were not familiar with it. For example, a newly appointed manager at one of the pilot locations was not aware of WSPs.

Among the lower level staff, there was no awareness of WSPs; all the junior staff approached to discuss WSP indicated they had not heard of it. It was not possible to get any in-depth comments on WSPs from staff outside of the quality control team.

5.5.4 Implementation

In response to questions on implementation, managers indicated: "*WSP has not been implemented yet; things are still at the information gathering"* (HII10). "*Most of the things that have been done have been done on paper, but nothing on the ground"* (HII3). "*WSPs are suggestions only, the project is not implemented it is only conceptual stage. It is being formulated after implementing we will know the results. They will give suggestions to Board and the Board can take decisions"* (HII8). "*The WHO and USEPA funded the WSP, these were only studies, we have not rectified the identified problems. The department itself is rectifying the identified problems"* (HII15).

In spite of these answers, managers pointed to activities taking place in their area linked to the WSP Pilot, for example, *"There was a number of cases during 2004-2005, pollution cases due to low lying areas and surroundings with RCC pipes and AC pipes which have now been located and shifted. Till now we have shifted a number of pipes. There were infection cases, jaundice, which have now been reduced*" (HII1)

5.5.5 Challenges

Several impediments affecting the implementation of WSPs were pointed out by the by the interviewees. The issues raised included financial difficulties, source protection, creation of public awareness, poor infrastructure, lack of data to drive the process, operations and maintenance practices, and difficulties related to serving the urban poor. In expressing these challenges they pointed out:

"It is a very challenging job for countries like India to have a water safety plan. People are not WSP acquainted, see the cooperation of the public is also very important in this, they have to be educated and this is big challenge. We have to conduct so many customer programs and educate the customer. The main cause of pollution to water safety is the customer" (HII3)

"Most important thing is this system is very old in Hyderabad. It is about 55 years old. There are some new areas, there is no problem, where there is old colonies about 50-55

years old we are facing some problems of water safety. Those areas should be concentrated on" (HII3)

We have to have a lot of financial inputs. It is very costly, the main issue is 24 hours water supply, the people have alternate day water supply and they don't want that, they want daily water supply, because of so many constraints we have, water quantity is going to be increased, water charges are going to increase. We need to reduce the consumption of water, the wastage of water. After introducing the 24 X 7 water supply, the cases of pollution was drastically reduced, pollution went down almost 80%, that means the water safety has increased" (HII3).

"There is a big difference between theory and the real job, unless you face the challenges you can't really know for sure. The importance of protecting the source, the country is developing and there are businesses growing in the vicinity of the source, there is no compliance with many regulations and it is difficult to enforce... In the old city the lanes are just 3-4 feet, the lanes are very narrow and in those narrow lanes the supply lines will pass, sewerage lines will pass, drain water also pass, so any damage anywhere and these can be entering into the system. Very frequently we have this problem. Sometimes the electric people will dig and damage our system and so we have these waters entering our system" (HII15).

"*The biggest challenge we are facing is the cost, this will require large financial input, the soil is affecting our pipes, people are building houses in the wrong places, also we need more information, more statistics. Sometimes getting information from the different people is difficult; everybody is very busy with their job*" (HII11).

"In slum areas customers used to dig pit taps, as a result rain water enters the system and this causes pollution, Government should provide funds and slum areas should be given priority" (HII11).

There are areas where the water mains are criss-crossing sewer lines, this is a source of risk. When the pipes are being laid this has to be considered because it can have serious implications (HII15). Why is there no consideration on where the pipes are

laid? "*There is consideration, but sometimes there is pressure to meet the supply needs and the quickest or easiest route is taken* (HII15).

"*The location of pipes in some places has not been well thought of, there are sewer lines crossing, I think more concern should be taken on where pipes are being laid*" (HII7).

"*Delivery is important, but safety is also very important, engineers should consider safety as well, when the water mains cross sewer lines it can be an ingress point, this problem has to be solved* " (HII10, 2008).

5.5.6 Benefits

Despite the challenges and confusion on WSP implementation, the pilot process was considered to be beneficial, for example:

"The main benefit is we are studying all the hazards, studying all the hazards scientifically using the GIS method, so all these, the water supply system, the drainage system, the filter plant, everything we are going to put on a GIs mapping and study these factors so we are going to study whether the risks exists or not" (HII15).

"By practically showing all the things that are affecting water supply, then we can say we have studied this and we have identified so many factors and we are practically rectifying them" (HII15).

"We are cooperating with the WHO people and the USEPA people; they are helping us to deliver the best water quality. We are adopting new technologies; we are sharing experiences, so naturally we are progressing" (HII15).

"The document that is coming out of this will be shown to the government, the results will be shown and necessary funding will be taken so other smaller organizations, water organizations can tap into the resources. So the next step in the process is to explain to the government" (HII15).

During one of the interviews, the manager referred to a division pipe network map on his office wall which had been created during the development of the WSP.

5.5.7 Looking Ahead

One of the promoters pointed out that it was essential to build relationships in order for WSPs to be successful. "*You have to devote a lot of time in the beginning to develop those relationships, bringing them together and having everybody understand their individual roles and responsibilities within the effort and always have the contacts to the larger efforts"* (HPI2). She pointed out that it was easy for people to retreat within their shells. She also pointed out that water supply was more than just the utility. She emphasized the need for a catchment to consumer approach indicating *"The catchment is often left out"*. She also mentioned the need to involve senior officials from the beginning. Things like having a signed letter from the municipal government indicating a commitment to the WSP process would have a positive impact on the process said the promoter. She indicated the need for capacity building from a technical institution or a university at the local level and pointed to its importance especially in places like India where people do not like materials from other countries. She said there was a need for having a country specific document instead of relying on global level documents. "*Especially like here in India people do not like to look at things from outside, from other countries as reference*" said the promoter. Explaining the preference, "*Part is a cultural thing and a pride thing*" she said. That is why it would be more appealing to have a Hyderabad case study for others to use as a reference.

Another promoter mentioned the importance of changing the community's mindset of seeing water as a community good to seeing of water as a commodity (HPI6). This, he said, was as an important precursor to the achievement of water safety. He indicated that the success of WSP would depend on acceptability, adaptability and a linkage to good service and public health. On trust, (after sighing!) he indicated that the concept of accountability, seeing of the utilities as being accountable to the public, was growing slowly. When it comes to the success of WSP in developing countries, the promoter stressed the need of having all the stakeholders on board. He indicated that all stakeholders from government to the public, from the catchment to the consumers had to be involved. Concerning training, he mentioned the need of a mentality change and the viewing of training as a continuous process and not a onetime affair. He said that in India, as far as the utilities were concerned, being sent for training was seen as a

punishment post. *"There are administrative reasons why somebody should not be put into some field and they will be transferred to the training centre but that man may not be interested in training,"* (HPI6). He also mentioned that the rules in the Indian system were such that one had to be transferred every three years. He said this could have a devastating impact if all the employees trained on certain skills were all transferred at the same time and replaced with others who did not have the same skills. In fact this was the case in the Serrilingampally where the manager was transferred leaving the pilot area with nobody skilled in WSP. He stressed the importance of having the WSP process linked to a training institution and also mentioned the need to regularly train the trainers. He also emphasized the importance of having training and training models provided in local languages. In addition, there would be a need to have practical aspects during training and thus some time spent outside of the classroom according to the promoter. For people who have not sat in classroom for a while, this would make the process more bearable. In order to disassociate training from punishment, he suggested linking training with personal progress. For example, before one gets promoted he would require to be trained in certain aspects of the job. Those who are not interested in training should not be sent for training and those who are sent for training should be given an allowance to cover the extra costs added the promoter.

Another promoter said training presented a challenge (HPI3). Once a few selected individuals were trained, the motivation of their colleagues and passing on of the newly acquired skills was a challenge said the implementer. He also stressed the need to have IT capacity within the organisation because for one, highly detailed mapping required for WSP would become almost impossible without a computer. Some implementers and promoters in Hyderabad indicated the need for a locally developed WSP guideline, pointing out in India procedures from outside the country was not well received.

Another promoter mentioned the need to have linkage between programs which are handled by different agencies and departments. He said "*Only with a co-ordinated holistic approach will things look better"* (HPI1). He pointed out to the need of epidemiologically finding the causes of diseases and stressed the importance of taking preventative measures for curative measures to take place. In terms of trust, he felt that it should not be about consumers trust only. The trust of the suppliers was also needed

such that they could directly drink water from the taps. He mentioned that trust in the community was secondary and would naturally follow if the suppliers trusted the water they supplied. In spreading WSP, the promoter pointed to the need of involving the public, the administration and the community. *"Some sort of awareness about WSP among the community is required*" said the promoter, pointing out that "*Many at times pollution takes place due to mishandling of water at the household level.*" He said that it would be important for each country's WSP, and even different WSPs within a country, to be treated as being unique and as having their own ways of handling issues. The promoter also said training presented a challenge. Once a few selected individuals were trained, the motivation of their colleagues and passing on of the newly acquired skills was a challenge. Confusing water quality testing (WQT) with WSP also concerned the representative. He thought that many people were generally thinking WQT is WSP. He also stressed the need to have IT capacity within the organisation because for one, highly detailed mapping would become almost impossible without a computer.

I attended a two days WSP workshop while in Hyderabad. During the opening of the workshop the guests of honour did not take their seats until an official request was made for them to sit on the stage. The guest of honour was the Secretary to Government Planning. Also present at the meeting were HMWSSB's Managing Director, WHO country representative, USEPA representative, members of local government agencies, and representatives from other water utilities in India.

HMWSSB's MD pointed out that even though water is of high priority in the lives of people, *"people do not take water very seriously. Whether it is paying the bills, using good quality water, or ensuring basic safety practices, people tend to forget"*. He also pointed out that slum dwellers are the most affected because of the failure to put into use very basic hygiene practices. He stressed the need to have attitudinal and behavioural changes when it comes to water. The MD reflected on his experience in Nizambad where it was very difficult to make the children and their teachers understand the value of using toilets. It was through a public campaign that "*the guard of honour*", people lining up outside sitting and defecating, was stopped. The MD also mentioned the need to link the whole process to the payment of bills.

In response to a feeling of accomplishment and reaching the end of the process, the USEPA rep pointed out that "*The important part comes next. The important point is now what do you do? What action can be taken*?" She also mentioned the need for having a single document in shareable form that included all the information from the pilot which could be shared with other water utilities and organizations. The document would also include the goals that have been set and this could be used as an advocacy tool on behalf of the Board to acquire the required resources and for chatting progress.

The Secretary to Government Planning indicated it was being projected for India's population to be 50 percent urban by 2030. He pointed out that the rural urban migration would not be accompanied by a change of habits and referred to this as the "*rural reality*". The Secretary said *"Though geography will urbanize, demography will continue to be burdened by the rural reality"*. In terms of suggestions to tackle the problem, the Secretary suggested the involvement of intermediate and degree students in some aspects of WSP education. He said especially involving girls was critical since they would be future mothers. The Secretary also asked what would happen after the end of the pilots and after the finishing of the workshops. He pointed out the need to be careful not to have resumption to business as usual within a very short time. He also pointed out the need to involve local leaders and politicians.

The Director of NEERI pointed to the difficulties caused by lack of data in initiating the WSP. Having a robust database the Director felt was requisite to any kind of assessment. The Director suggested to the other present utilities to start collecting data.

5.6 Inside HMWSSB

In this section I will present employee perspectives on aspects such as organizational priorities, and changes, risk management and the organization's future.

- **Organization's Priority**

All the employees indicated the organization's priority is the provision of potable water. Also there were references to water safety, keeping supply times, educating the customers, and provision of sewerage services. Examples of comments include:

"*Main priority is to give potable water to customer without delaying any supplies and maintaining timings and speed the education of compliance*" (HII10).

"*Priority is to have pollution free water and safe disposal of sewerage*" (HII3)

"*Main priority is to give wholesome water, good, clean water and maintaining sewerage, safe water supply*" (HII8)

"The population is increasing so naturally we are focusing on increasing our water supply, new sources have been commissioned" (HII15).

- **Significant Changes**

In explaining changes that had taken place in their organization, employees reported the creation of the Board as the most significant change. For example: "*Main change has been the creation of the Board, an autonomous organization with social responsibility also*" (HII5). "*The organization is changing fast, now it has become a Board and we are concentrating more on the public problems*" (HII2).

References were also made to the increased autonomy for managers to make decisions: "*Now we can make independent decisions, we are committed to serving the people*" (HII8). Others pointed to employee development and technological changes: "*We are becoming more professional, using sophisticated technologies, sewerage treatment from only primary to secondary. We are also taking World Bank aided training programmes*" (HII8). "*Lots of changes have occurred because we are adopting lots of technologies. We are having construction of filter beds, we are going for rapid sand filtration, settling tanks, pre clarifying, post clarifying, we are adopting new technologies*" (HII15).

Improvements to customer services were also mentioned: "*We have made it easy for the customer to approach us, customer relations are much better*" (HII3). "*After introducing the 24X7 project the cases of pollution was drastically reduced, pollution from the supply went down to about 80 percent. Pollution went down and that means water safety has increased*" (HII3).

- **Internal Relations**

The internal relations in the organization were very formal. In conversations junior managers referred to senior managers as "sir". During visits to HMWSSB offices it was common to see junior staff saluting military style to the managers. This high level of respect was also portrayed by managers towards the MD. During a WSP workshop whenever the MD entered the room all the managers and other employees from HMWSSB would stand up and remain standing until the MD took his seat.

Communication between managers was facilitated by the use of official mobile phones. When asked how internal disagreements were resolved, managers gave different answers:

"We don't have any disagreements, we don't have such problems. Anything, whatever we say they accept it" (HII3).

"There is no any disagreement" (HII11).

"We will have a joint meeting of the officers and have an open forum we will try to solve the problem through discussions" (HII8).

"One thing is I will tell you once there is infection and admission in the hospital, the government questions all the people, they will question the medical people, municipal people and they will question the water board people. Before one department used to blame the other department, but now the government has made a law that all these three departments have to be responsible. They have to coordinate, take action, rectify, and report to the government that we have done this, so we can't blame another department, so a co-ordinated effort is taken up" (HII15).

- **Working for HMWSSB**

The main word used by employees to describe working for HMWSSB was 'challenging' for example: "*Working with the water Board is challenging because we have limited resources, highly populated area, consumers are aware about the diseases they get from water, so naturally it is quite demanding*" (HII15). Some employees felt that the organization did not present enough opportunities for instance *"Here there are*

not a lot of opportunities; you work in the same organization till retirement" (HII3). One employee mentioned dissatisfaction with salary levels among employees indicating: "*Staff is lost because of low government salaries; a full engineer is only getting 25, 000 rupees"* (HII10).

However, there was some indication of satisfaction despite the challenges: "*This is very interesting and challenging, we get a lot of satisfaction because we are meeting so many people daily and we are satisfied by solving people's problems. We also get so many opportunities that you don't get in other organizations; it is an essential service*" (HII8). "*Working for the Board, this is a great organization serving the city and doing a great service for the people"* (HII6).

When asked about training, employees indicated that they were trained at the staff college or the training centre. They also mentioned receiving extra training from Osmania University. Some of their comments include:

"Training is good for internal matters handled by the Training Centre. For these projects like WSP we require some extra training. Local training is provided but nothing on WSP" (HII3)

*"Training matters are being looked after by our training department" (*HII8)

Some members of the staff were proud of holding training activities such as the WSP workshop. However, one of them (HII11) pointed out that the timing of some training activities could be changed such as those conducted during exhibition times.

- **Risk Management**

Only 20% of the interviewed employees were comfortable in discussing risk management. Individuals who had participated in WSP related activities showed familiarity with the language. Explaining risk perception in the organization, some managers pointed to problems linked to the distribution system and customer activities as their main concerns: "*Main risks are from customer connections which are not well maintained*" (HII3). "*Being a very old system, we have to change the pipes*" (HII12). Below are some of the responses given in relation to different aspects of risk management.

On risk assessment: "*Risk assessments, we don't do it right now. We have appointed some consultants and we will look into those recommendations*" (HII8). "*Now this is honestly a difficult issue, because we are short on capacity. The reality is if we had surplus then we can allocate for these things, whenever a problem arises then we have to deal with it, so it is a fire fighting process*" (HII15). "*We use the feedback we get from the customers*" HII3

On water quality monitoring: "*We taste residual chlorine at the customer end that is what we have now. We used to have so many complaints before but the situation is improving*" HII3. "*At the filtration plants the water is pure. The problem is with distribution, there are places where the water lines are criss-crossing with sewer lines, we have about 50 booster chlorination systems and we use that also*" HII15

On risk classification and prioritization: "*We classify risks into high, low and medium risks; we prioritize risk by zonal analysis*" (HII11). "*We analyse our system on how efficient it is because we got the Metro Customer Care, it's a centralized pool of complaints regarding water quality, water quantity, billing and all these, so this is analysed according to the area. The area supply manager is looked at in terms of the number of complaints he is getting, what he is doing. Our efficiency is frequently monitored by our board of directors*" (HII15)

On control measures (efficiency and necessity): "*The present control measures are not efficient, it requires improvements*" (HII3). "*Control measures are efficient*" (HII11).

On emergency procedures: "*Emergency is dealt with on a daily basis*" (HII11). "*Yeah, emergency is there daily, it's part of daily activity, we have people working 24 hours a day. We have mobile phones, so any emergency we have to respond, whether bursting of pipelines or anything in this regard we have to take immediate action. We got our mobiles emergency numbers, it is official*" HII15

On monitoring, reporting and communication: "If *there is any problem you report to inform first manager and up the ladder as required*" (HII11). "*Problems will first be brought to the attention of the section manager, then the DGM and up the ladder. All will be through telephone everybody has a mobile phone*" (HII8).

On record keeping: "*Record keeping we don't deal with, there is a separate wing. QAT-Quality Assurance Testing. They do the testing and are co-ordinating with other departments like IPM – Institute of Public Medicine*" (HII8).

- **Organization's Future**

Majority of the employees felt their organization's future had a positive outlook. For example: "*The board will be number one in our country because it has been expanding rapidly and merged into Greater Hyderabad, all surrounding municipality have been merged. We have major computerization and pursuing all types of technology available, trying to go ahead"* (HII8). Others pointed to increasing supply and revenue collections in their areas indicating positive trends towards the future. At the same time some were also cautious in their positivity: "*It will still be difficult, it has to be changed, we need development growth*" (HII1).

- **External Relations**

Describing the communities they served HMWSSB employees indicated:

"Hyderabad is a mixed area, there are so many slums and there are some posh areas. The most important thing is this system is very old in Hyderabad, about 55 years old. There are some new areas, there is no problem, in the old areas we are facing the problem of water safety, these areas need to be concentrated on" (HII3).

"Community are low income people, low class income people where the surroundings are located with densely populated area and nearby trains not suitable soils, that also makes problems for them and their storage was also not proper" (HII11).

"There are different kinds of people in the community mixed. And every segment has different needs. We will act according to their needs" (HII8).

"Main risk is from the customer connections. Old customer connections and connections are not properly maintained. The customer's role is very important for safety. They have to maintain their pipes and plumbing systems and ensure they are good now we are educating them" (HII3).

"Consumers have an important role to play. They should go for illegal connections, that is the first thing second thing is if there is any other need to tamper with the lines they should get permission and give voluntary information on what is happening on the streets" (HII8).

"One thing I would like to change is the consumer, the slum people, the people below the poverty line, the way they collect the water, the way they store the water, the way they handle the water, we got a lot of problems because they have low hygiene practice" (HII15).

Interviewees indicated that relations with customers were previously not good and pointed out to several activities undertaken to improve relations with customers:

"*They did not have a good impression previously. Presently they have a good impression after improvements. We have customer care cells and a customer relations office. We also have an online system*." (HII3)

"*The customers are mostly satisfied. Some discontentment will be there but mostly they are satisfied but I think we can do much better*" (HII8)

"*Our board conducts periodical interaction with consumers through different forums, door to door meetings, through seminars and we have neighbourhood committees mostly in slums*" (HII8)

"*Our linesmen, the base grass root workers, inform the customers*". (HII8)

Now we also have customer care which deals with any complaints around the clock 24 hours (HII10)

These views on improvements in customer service were also corroborated by customers. Despite getting water a few hours a day or every other day, nearly all the customers indicated they were satisfied with the service they received. They indicated having trust in both the water and the water utility. Some of their comments include:

"*Water situation, has changed. Pipes have been changed, HMWS&SB is good, sending water 8.30 -11.00 a.m. in our area. Water comes alternate days. Same since last 2 years, pipe line change since last year* (HCI14)

"*People think good about water people. We trust them. Because they come to help us, whenever we complain they will do it within one or two days. We trust the water because it is already tested, already purified. They only send the water after testing it."* (HCI50)

"Last year there was water problem, 2 days 3 days pipes collapsed, now there is no problem, if there is a problem the Water Board comes quickly, we are part of the 24 hours scheme, there is no problem" (HCI44)

"Supply changed since the last 2 to 4 years, very good suppliers. Now we get water early morning to 11 am, good water, nice water" (HCI27).

"We get our water from taps only, water comes from the government. In this Hyderabad city there is good sufficient supply of water no need to worry about water. We have good water for drinking" (HCI50). How often do you get the water? "*We get water 3 hours in the morning, before it was one hour"*. (HCI50).

When it came to communicating with HMWSSB most of the customers were familiar with the Board's customer care cells and the customer care telephone number. All the customers seemed to be familiar with the customer service roles of HMWSSB. All the customers interviewed knew about complaining if there was any problem with the service they received. When asked if they had contacted the customer care centre, the ones who had, indicated they were generally satisfied with the service and that it took two to three days to get a response.

The most preferred method of receiving information from the Board was radio. Explaining this preference one customer pointed out: "*Radio first, because most people have radio, then news paper and TV last. Leaflets are not good will be thrown in dust bin. They will not read coupons. They should say no wasting of water and keep the city clean"* (HCI24). Some customers also indicated they would complain to their local

leaders if there were any problems: "*We will go to complain to our leader. We will complain to MLA, our leader, he will look after it"* (HCI50).

The need for support from the political leadership in engaging the public and allocation of funds was indicated by employees, for example: "*When we are dealing with the consumers we have to involve the local leaders, when we are educating the consumers, so they can explain to them., because naturally we have the members of parliament or the legislative members so they can allocate the necessary funding also*" (HII15).

The information the customers indicated they needed regarded water supply and quality. They wanted to be informed if there were going to be any changes to their supply times or if there were any concerns regarding the water quality. They indicated that the Board also made announcements from loudspeakers mounted on a Jeep that went around the community.

When it came to attending information meetings, some customers pointed out that they would attend the meetings, but they would not say anything during the meetings, indicating that they would follow up on the issues raised later. For example, "*First we should get good water, what they say we will listen; we can't say anything in meeting. We will listen and we will follow them"* (HCI31).

On working with international organizations that promoted WSPs, HMWSSB employees pointed out: *"It is an excellent idea, but the circumstances, it is difficult for them to suit into this situation"* (HII3). Why would it be difficult? *"The situation here is very different from developed countries, the culture is different"* (HII3).

Other views on working with international organizations promoting WSPs included:

"They can share experience because of their wider exposure of WSP in different places. We can also be given exposure to projects in other places and training. They can also contribute financially" (HII5).

"Benefits will be they can transfer the ideas and knowledge that they have and the latest information. The disadvantage is that they will face languages and cultural problems.

It will take lots of time for adjustment ...They can give financial and technical knowhow" (HII8)

"They are sharing their experiences with us, the people working here should also be taken to other countries see what stage we are at and how to develop ourselves. That is, again, aah, we can learn from each other, our MD has said you can come, see our system, with cooperation lots of things could happen" (HII15)

"They should concentrate mostly on developing countries first and they should select upcoming cities like Hyderabad first so that we can be an example to other cities and towns. That way it will be good. (HII8)

"There is a lot of scope for the donors, they can share their experience. The thing is we are doing this project without any outside experience; we are doing it with no exposure to other places. The people who are involved in this water safety plans, they don't know what they have to do, there is no training. Exposure to other projects in other places will be important" (HII3)

A local WSP promoter pointed out *"The donors are coming and making suggestions based on our comments and they are just leaving, this is not the thing, they are just coming and explaining it and going to management and just leaving, there is no action taken from the management"* (HPI1).

5.7 Challenges Facing Organization

Since the mid 1980s Hyderabad has been faced with water shortage crisis (Ramachandriah and Vedakumar, 2007). The interplay of several factors which have led to the current state of affairs is explored below.

The main challenge seen to be facing HMWSSB by its employees was lack of financial capacity to provide a service level that would meet customer demand. In explaining this factor, related issues such as illegal connections were raised: "*Our system is very old and we have to input financially, it is very costly, very, very and public co-operation is not there*" (HII1). When you say public cooperation, what do you mean? "*A lot of*

people are not paying their water bill, there are many illegal connections and this is not good for us." How are you dealing with these illegal connections? "*We will organize a special drive our vigilance department is there we will take their help. First will detect the houses and then disconnect them or regularize them through penalties and thirdly we educate the public on regularizing illegal connections*" (HII1). How effective has this been? "*We have done over 2 thousand illegal connections, you know this is a big challenge because many people don't want to pay for water, they want water to be free*" (HII1).

Non-revenue water is considered to be the main cause of disparity between HMWSSB's income, around Rs 300 million, and its expenditure at between Rs 450 and 500 million (Ramavat, 2010). The State government has been providing the Board with grants-in-aid which for accounting purpose have been treated as contributions either to the HMWSSB's capital base or to operating expenses (Davis, 2005).

The number of illegal connections in Hyderabad are thought to be close to 25, 000 (Ramavat, 2010). HMWSSB has been using a voluntary disclosure scheme aimed at regularizing these illegal connections. Recently more than 3000 consumers got their connections regularized earning the utility almost Rs 20 million.

In the recent past the Board had to keep tariff rates low as a result of pressure from elected officials who consider water to be a social good that is to be provided at low or no cost to residents, especially the poor (Davis, 2005). Despite the objections, the HMWSSB has managed to raise water fees and connection charges on three different occasions since its inception: 17% in 1993, 25% in 1997 and 64% in 2002 (Davis, 2005). However, these raise have not resolved revenue problems because only around 50% of metered users pay their bills and most of those who receive water from the Board pay a flat rate since they have not installed meters yet (Celio, 2007)

Hyderabad's politicians have also obstructed efforts to dismantle illegal connections or disconnection for non-payment. Davis (2005) explains that:

> "Further, Hyderabad's politicians obstruct efforts to dismantle illegal connections and to disconnect households who have not paid their water bills.

> Board staff who attempt to enforce such penalties often find themselves transferred to a "penalty post" in an undesirable department. In some cases, local leaders have even organized residents to confront and threaten Board staff attempting to enforce disconnection rules."

High levels of unaccounted for water (UFW) have also been cited as a reason for rejecting the MD's request to increase tariff rates by the Board. UFW is estimated at 40-55% of supply. The Board has recently changed its tariff structure and adopted an increasing block tariff instead of the differential pricing for industrial, commercial, and residential customers (Davis, 2005).

The Board has been dealing with non-revenue water through increased vigilance and efficiency in billing through more systematic meter reading, bill delivery and bill collections. The Board's 735, 000 water connections have been divided into 550 different dockets each docket covering 1000-2000 consumers. The Board is also installing automatic meter readers (AMR) which can pick up and transfer data to the Board's server. In addition to helping monitor water flow and consumption rates and patterns, it is also hoped that the AMRs will lead to transparency and reduce corruption at the meter reader level (Ramavat, 2010). HMWSSB has also been making progress in the collection of sewerage tariff. These efforts include levying charges on consumers who don't use the Board's water but use its sewerage network.

When asked what they thought of corruption in India, the employees indicated it was an issue of concern for example, "*Corruption is a big concern in India, the problem is there but finding a solution has not been easy"* (HII7). When asked about corruption at HMWSSB employees portrayed anxiety. 80% of them acknowledged that corruption was a problem affecting the Board's revenue collection and service provision. Some pointed out to measures that had been taken to encounter corruption. For example, *"We have centralised and computerised the system for applying for new connections, all the prices are listed and everything is clear, so the customers know"* (HII10).

Among the customers, 90% of those interviewed, corruption was considered to be an issue of concern in India. When asked how corruption was affecting the services

provided by the Board, 70% of the customers thought corruption was negatively affecting water provision. Some of their comments include:

"You have to pay somebody so you can get a connection. Before it was different, you paid the municipal people direct, but now the anti corruption is there and the board people don't take the money direct, you pay somebody else and they solve your problem" (HCI6). How much do they charge let's say for connection? *It depends on the situation, if you have a new building it can be 90,000 rupees"* (HCI6).

"My brother in-law wanted to increase the size of the pipe that brings water to his building, when he talked to the water inspector, the inspector wanted two and a half lakh[3]*, my brother in-law refused to pay and he dug a borewell which cost him 70, 000 rupees"* (HCI48).

"Sometimes you have to pay something in order to get quick connection" (HCI4)

"When the bill is high and you cannot pay it all, you give the water man something and he does not disconnect you" (HCI13)

"If you give them some money they make your bill small" (HCI40)

"After you have a water problem they don't fix it quickly if you don't pay them" (HCI26)

"They disconnected my neighbour, but when she paid the engineer some money he connected her back" (HCI31)

The corruption practices referred to by both Board employees and staff mostly involved front-line staff. However, media reports on corruption practices at HMWSSB indicate a more complex picture involving management level corruption. Some examples of these include a story reported in The Hindu (2009) indicating an audit at the HMWSSB revealed misappropriation of 20 million rupees over a period of three years involving contractors, cashiers, and managers. According to the story:

[3] Which is 250, 000

> "Though modern systems were introduced in all areas of the Board, they were practicing the age-old method of issuing vouchers for expenditure and manually disbursing the amounts. If a contractor executes a work and is supposed to be paid Rs. 10,000, the cashier moves the proposal, the Deputy General Manager approves it and the Chief General Manager sanctions the money ... The cashier presents a self-cheque in the bank in his name for the amount sanctioned, collects the cash and pays to the contractor. "The fraud began with the cashier, now and then changing the figures-for example from Rs. 10,000 to Rs. 20,000. He would collect Rs. 20,000, give half to the contractor and retain the remaining sum," an investigator said."

In another story, The Hindu (2008) mentions the prosecution of a HMWSSB Deputy General Manager by the Anti-Corruption Bureau "for allegedly possessing assets disproportionate to his known sources of income" And in another story reported by TNN (2008) a General Manager was arrested by the Anti-Corruption Bureau after searches at his property revealed several kilos of gold, silver and commercial property titles concealed in his residence including his servant quarters and his ventilation system. The properties were registered in his wife's name.

Others who have looked at how corruption affects water services in Hyderabad consider non implementation of laws and regulations as being mainly driven by corruption. For example, Ramachandriah and Prasad (2004) indicate that "Rampant corruption and the industrialist-politician-bureaucrat nexus have played havoc on water bodies". They explain the extent of the industrial lobby's power indicating that a sitting Judge of the Andhra Pradesh High Court was transferred overnight for giving closure orders to some highly polluting industries.

Unabated pollution from untreated domestic sewage and toxic industrial effluents have rendered several of Hyderabad's lakes, identified as potential sources of drinking water, unusable (Ramachandraiah and Prasad 2004). In 2002 18 of Hyderabad's 87 lakes were found to be highly polluted and by 2004 the number had grown to 42 (Kunz, 2007). The cases of River Musi and Hussein Sagar Lake show the extent of the pollution problem. Out of River Musi's 256 km length, the 28 km section that passes through Hyderabad is described as the most severely polluted section of the river (Ramavat, 2010).

When asked about pollution affecting water supply, employees at the board mostly spoke of pollution happening as a result of illegal connections and ingress from sewer due to ageing pipes and their locations. Explaining how pollution from other sources such as industries were dealt with, they indicated this aspect was handled by the Andhra Pradesh Pollution Control Board (APPCB), a statutory authority entrusted to implement environmental laws and rules within the State. In May 2009 the consumption of contaminated water in the Bholakpur area of Hyderabad city claimed 12 lives and led to the hospitalisation of 300 others (The Hindu, 2009).

Due to increasing population and slow expansion of service coverage many people are resorting to groundwater usage. Increasing number of bore wells and the decline of groundwater table has resulted in the bore wells now being dug up to over 800-1000 feet in several areas as many old bore wells are drying up. "With the loss of water bodies and the consequent decline in groundwater table, long-distance and expensive water projects are being undertaken to provide water to the city" (Ramachandriah and Vedakumar, 2007).

The pollution and encroachment of water bodies in Hyderabad has been encouraged by the non-implementation of building regulations and pollution control laws (Ramachandriah and Prasad, 2004). This non-implementation occurs in spite of the existence of about 200 Indian Central and State laws aimed at protecting the environment (Sinha, 2001 cited in Ramachandriah and Vedakumar, 2007). An institutional analysis of wastewater (non) treatment and reuse in Hyderabad by Devi and Samad (2008) shows a wide gap between the declared rules and rules-in-use. Among the reasons attributed to the existence of this gap are insufficient organisational capacity in monitoring and implementation, low awareness levels among residents, and rules that have not kept pace with changing socio-economic conditions. The recently approved Water, Land and Trees Act which requires that one seeks permission before digging any bore well and prohibits withdrawing water from below 500 feet of ground provides an example of legal requirements that are frequently flouted by people from all sections of the society (Ramachandriah and Vedakumar, 2007).

5.8 Conclusion

This case shows that in Hyderabad culture is variedly conceived. The cultural perceptions of water are linked to theistic beliefs and related rituals. These beliefs include water being a source of life and a gift from God. Two of these rituals are connected to water pollution and excessive water usage. Water supply in the city is mostly intermittent forcing the customers to rely on storage. The unhygienic handling of such water reveals safety concerns. Most of the customers indicated judging the safety of their water on the basis of aesthetic aspects such as colour and smell. The water utility faces several challenges in the sourcing, treatment and distribution of the water that affects the attainment of water safety. Linked to these challenges are practices linked to the utility's organizational culture such as perception of training. Also linked to these challenges are practices at the level of interaction between the customers and the utility such as corruption the levels of implementation of laws.

6 KAMPALA CASE

6.1 Introduction

This chapter presents findings from semi-structured interviews, field observations and document reviews on the Kampala WSP pilot project. The presentation of the findings begins with a description of the location and its people taking into account aspects such as their culture and perceptions of water safety. This is followed by a brief account of the areas' water utility and details on the water supply system. After this, a full description of the WSP project is provided covering aspects such as how the idea came about to suggestions on ensuring its success. The last sections of the chapter revisit the water utility and examine the internal workings of the organization and the challenges it faces.

6.2 Location and People

Kampala, the administrative and commercial capital of Uganda, is located on the northern shores of Lake Victoria, the largest freshwater lake in Africa and the second largest in the world. The city covers an area of 169 km^2 with an estimated population of 1.7 million people for 2011. Kampala is administered by the Kampala Capital City Authority. Administratively, the city is divided into five divisions: Makindye, Central, Nakawa, Kawempe, and Lubaga. Kampala lies on a plateau spreading over 20 hills.

Figure 6-1: Map of Uganda (Oxford Cartographers, 2009)

The city's history is traced to its establishment as the capital of the Buganda Kingdom in the 1600s. Although Kampala has a diverse ethnic population, most of the residents are from the Baganda ethnic group. Other major ethnic groups include Bagisu, Banyankole, Bakiga, Basoga, Iteso and Acholi. The main languages spoken in Kampala are English, Kiswahili and Luganda. The three largest religious groups are catholic, Anglican, and Muslim.

Since 1980 Kampala's population has quadrupled (Table 6-1). An urban fertility rate of 4.4 children per woman has contributed to this growth. Also fuelling this growth is rural urban migration driven by high poverty rates in rural areas. This growth has resulted in increased water demand.

Table 6-1: Population Growth in Kampala (Bremner and Zuehlke, 2009)

Year	Population
1980	458,503
1991	774,241
2002	1,189,142
2011 (Projected)	1,659,600

Lake Victoria plays a significant role in providing resources to more than 30 million people and its basin is considered to be the one of the most densely populated rural areas in the world. Average population densities are 297, 97 and 635 per km2 on the Kenyan, Tanzanian and Ugandan sides of the lake respectively (UNEP, 2006).

6.2.1 Description of Culture

Kampala's participants' first descriptions of their culture were mainly based on their ethnicity (98%). The remaining 2% used religion. 86% of the participants again offered their ethnicity as a second descriptor, while religion and locality was used by 4% and 10% respectively. Examples of these descriptions include, "My culture is Baganda", "I am Iteso", "I come from the Acholi", and "I am Hindu".

6.2.2 Cultural Perceptions and Uses of Water

Explanations of cultural perceptions and uses of water provided by customers in Kampala were tinged with references to the realms of religion, spirits, and traditions.

"In our traditions water is associated with the spirits and we believe the spirits live in the water. Because these are ancestral spirits of our heroes water is respected and is used in blessings" (KCI50).

"We believe in one god who is the creator and owner of everything on this earth. In our language we say Katonda, that is his name. We say he lives in the lake, we say Nalubale, not Lake Victoria. This water is from Katonda and that is where he lives. We say the lake is our protection because of this" (KCI22).

"In African traditions water is connected to the spirits, I think one famous story from East Africa is the maji maji rebellion against the Germans in Tanzania. People believed the water would protect them from the bullets" (KCI30).

"From the African tradition perspective we believe spirits are found in water, like Lake Victoria, it is known in our culture as Nalubale, and this we say is where the Holy spirit, Mukasa stays. And as Christians people believe in baptism, so water is used in baptising people" (KCI13).

"We believe God created all living things from water. Water is the source of all life. We use water in everything we do, producing food, drinking, eating, cooking, cleaning ourselves, everything" (KCI17).

"Baptisms are conducted in Lake Victoria. Sometimes it is done for large groups or individuals. I think I have seen even foreigners being baptised in the lake"

You can not engage in prayers before cleansing yourself (KCI38).

We use water to clean ourselves physically before appearing before God so he can clean us spiritually (KCI8).

Following up on an observation made on water usage in a mosque in Hyderabad, I visited Kampala's main mosque. In an interview with the mosque's Imam he explained that water usage in mosques presented a challenge because of the amount of water used. He indicated that they had installed water saving taps at this mosque to remediate the problem. Reflecting on his past experiences at other mosques and the usage of water in ablution the Imam explained:

The process of ablution is part of prayer and being extravagant is not allowed. People run the taps full blast and waste a lot of water. This is not allowed, in fact the Prophet peace be upon him, did forbid extravagance during ablution. He indicated that being extravagant even in a running river is not allowed. The value of water is well acknowledged in our religion, which is why we have provisions for ablution without water. This is called tayamum, if there is no water you perform ablution using dust. So how can we be extravagant with water? (KCI38).

I visited a different mosque in the city which had no water saving taps. One of the caretakers at the mosque indicated concerns with water usage pointing out "*People use a lot of water, more than they need, the water bills are very expensive*" (KCI1). Quantitative assessment (Appendix C) of ablution water use at this mosque showed usage of up to seven litres and an average of four litres per ablution.

When asked how paying for water was viewed in their culture, 80% of the customers indicated that water was seen as something that should be free.

"See, Lake Victoria is just there naturally full of water, why should anybody charge for what is freely available?"(KCI27).

"Water is free from God; it should not be charged for" (KCI33).

"Poor people should not pay for water; the government should provide water for them" (KCI20).

Water belongs to the people, our religion tells us water belongs to the community, paying for water, aah is not something that is necessary (KCI37).

In our culture paying for water is, eeh, how should I say it, there is nothing like it (KCI26).

"The idea of paying for water is something new to our culture, it is a foreign idea that has come with colonialization and modernization, I think people can sometimes see its benefits, we are still struggling with it. When you say sometimes what do you mean? *Ummh, when water is available from the taps, and it clean, people feel happy and they think it is worth paying for, but when there is no regular supply or the water is not clean, people become upset and again people think we should not be paying for this in the first place"* (KCI39).

6.2.3 Water Safety Perceptions and Storage Related Practices

In Kampala 80% of the customers mentioned boiling their water before drinking. Others indicated using the aesthetic aspects of water to judge its safety. For example, "*When the water is safe it is not brown"* (KCI3). "*When water is safe it tastes like water, nothing else* (KCI12). "*Good water has a natural taste"* (KCI6). There was a clear assumption among those who boiled their water that no matter the aesthetic state of the water, they boiled it. More comments related to the need felt to boil water are shown in section 6.6.7.

All the customers indicated having some form of water storage mechanisms ranging from jerry cans to rooftop tanks. As seen in Figure 6-2, it was common to see individuals acquiring jerry cans for water storage. 60% had overhead storage tanks; others used plastic barrels and jerry cans. 90% of the customers indicated they had a designated container for fetching stored water. However, there were several observations of the water fetchers' hands coming into contact with the stored water. Only 30% of the customers indicated supplementing their water with other sources. 20% of the customer households had visible excreta in the premises.

Figure 6-2: A boda boda (local taxi) transporting water storage jerry cans in Kampala (author, 2009)

6.3 Water Supplier

The National Water and Sewerage Corporation (NWSC) is responsible for the provision of water and sewerage service to Kampala's residents. This corporatized public owned utility is an autonomous entity which also serves 23 other major towns and urban areas in Uganda (NWSC, 2009). Established as a government owned parastatal in 1972, the organisation's legal framework was further strengthened by the NWSC Statute of 1995, later enacted into the NWSC Act of 2000 (Mugisha, 2007). In addition to requiring NWSC to provide water and sewerage services on a sound commercial and viable basis, this Statute also requires the Minister for Water Affairs to enter into a performance contract with the organization regarding its operations in accordance with the provisions of the Water Statute. Through this Statute, NWSC is also empowered to own assets in its service areas.

NWSC's mission is: "to provide efficient and cost effective water and sewerage services, applying innovative managerial solutions to the delight of our customers" and its vision is: "to be one of the leading water utilities in the world". The organization's structure is shown in Figure 6-3.

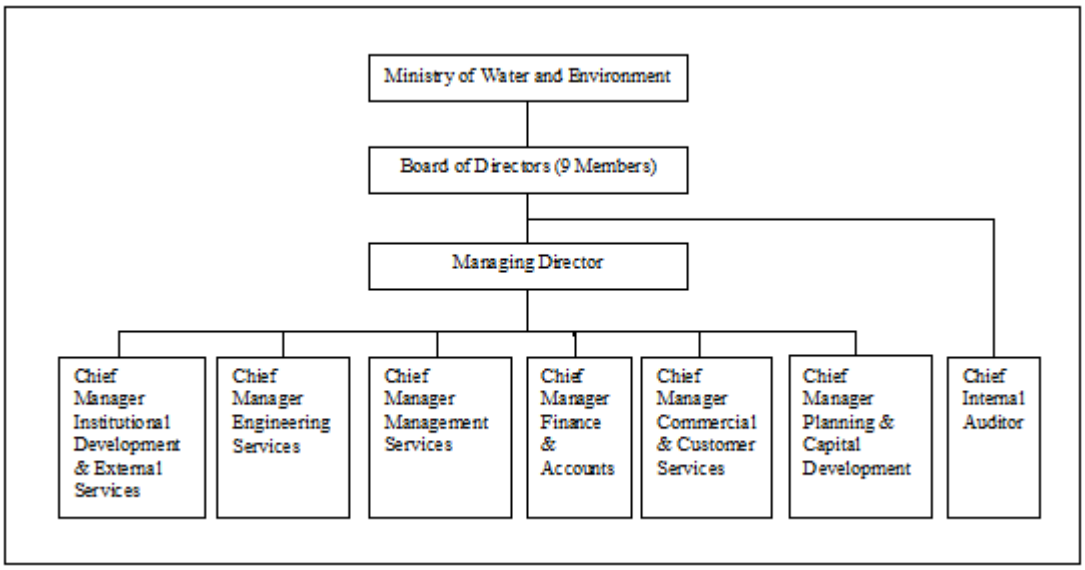

Figure 6-3: NWSC's Organizational structure (NWSC, 2008)

The corporation's history shows it served three towns in 1972. In the early 1970s the organization was efficient in its investments; however, during the late 70s and the early 80s the water and sewerage services were dilapidated. From the mid 80's to early 90's substantial investments were made in infrastructural renewal.

By 1998 the organization was mired in inefficiencies and poor performance (Mugisha, 2007). A new board of directors was appointed the same year, at the same time the board appointed a new managing director. Under the new leadership, the organization implemented several change management programmes (Table 6-2) aimed at improving the operational and financial performance of the corporation.

Table 6-2: Change Management Programmes at NWSC (Compiled from NWSC, 2008)

Management Programme	Focus
100-day	Reversing operational and financial inefficiencies
Service and Revenue Enhancement	Restoring customer confidence and hence service delivery
Area and Service Performance Contracts	Getting areas to break-even by empowering managers and giving them autonomy to take important decisions
Stretch-Out	Improvement of operating margins by reducing bureaucracy, increasing speed, simplicity, worker involvement and instilling self confidence
One-Minute Management	To cater for individual performance accountability
Internally Delegated Area Management Contracts	Giving more autonomy to areas, clear role definition, better incentive plans and apportioning more operating risks to partners

These change management programmes led to performance improvements in several key areas as shown in Table 6-3

Table 6-3: NWSC Performance Improvements (Berg and Muhairwe, 2006)

Measure	1998	2006
Service Coverage	48%	70%
Unaccounted for Water	51%	29%
Percent Metered	65%	99.6%
Percent Connections Active	63%	94%
New Connection/year	3,317	23,312
Total Connections	50, 826	148, 312
Turnover (Revenue)	US$ 11 million	US$ 34 million

However, NWSC's sewerage coverage for Kampala is only 5% (NWSC, 2010). The Bugolobi sewage treatment plant has a treatment capacity of only 33,000 m^3 of wastewater per day. The current sewer pipe network only reaches Nakasero, Bugolobi,

Kololo and parts of the city's central business district. NWSC attributes lack of funding to this low coverage rate.

6.4 Water Supply System

Among NWSC's service areas, Kampala is the largest and accounts for 65% of the utility's revenue (NWSC, 2010). Below is a description of Kampala's water supply system including the water source, treatment processes and distribution.

6.4.1 Water Source

Kampala gets its water from Lake Victoria, the largest fresh water lake in Africa and the second largest in the world. The Lake is bordered by Kenya, Uganda and Tanzania, and occupies a total catchment of about 250 000 km^2, of which 68, 870 km^2 is the actual lake surface (URT 2000, cited in UNEP, 2002). The lake draws 20% of its water from rivers in the three riparian countries and the remaining 80% from rain (UNEP, 2006). The abstraction point for Kampala's water system is located in Murchison Bay.

6.4.2 Water Treatment

Water drawn from the lake is treated at Ggaba Water Treatment Plant located on the shores of Lake Victoria's Murchison bay. This facility, located seven kilometres east of Kampala, comprises of three independently operating plants: Ggaba I, Ggaba II and Ggaba III. Table 6-4 shows the treatment processes and capacity at these plants.

Table 6-4: Water Treatment at Ggaba (Compiled from NWSC, 2009)

	Ggaba I (1928)	Ggaba II (1992)	Ggaba III (2007)
Treatment Process	Screening, settlement, coagulation-flocculation, clarification, rapid gravity filtration, disinfection and water conditioning.	Same as Ggaba I	Screening, pre-chlorination (to deal with effects of algae and shrimps), coagulation, flocculation, clarification disinfection and neutralization.
Average daily supply	50,000 m^3	67,000 m^3	78,000 m^3

6.4.3 Water Distribution

The combined capacity of the works is 195, 000 m^3/day. Water from Ggaba is pumped into five main service reservoirs and then distributed by gravity and additional boosting where gravity flow is insufficient. The whole network covers over two thousand kilometres (Table 6-5).

Table 6-5: Kampala Water Supply and Sewerage Coverage by June 2010 (NWSC, 2010)

Total No. of Connections	Pipe Network (kms)	Targeted Population June 2010	Population Served	Water Coverage 2010	Sewerage Coverage
146, 243	2, 253.31	1, 716, 669	1, 277, 407	74%	5%

6.5 WSP Project

6.5.1 Drivers and Description

Uganda's NWSC was the first water utility in Africa to develop a Water Safety Plan. The Kampala pilot was started in 2001 through funding from the UK Department for International Development (DFID) and technical assistance from the Water, Engineering and Development Centre (WEDC) at Loughborough University. At the time Ondeo was involved in the management of Kampala water as the system operator through Ondeo Services Uganda Limited (OSUL). Also involved in the project was the Public Health and Environmental Engineering Department of Makerere University.
Explaining why they got involved in the process: *"The culture of National Water, it is always willing to pilot, we are conscious but not very rigid"* (KII10). In adopting WSPs *"we hoped for cost reduction and enhanced communication among stakeholders. We have achieved cost reduction but communication still needs to be enhanced*" (KII9).

Full cooperation and understanding from senior management at OSUL and NWSC was achieved through detailed discussions and creation of awareness of WSP benefits to the organization. NWSC's MD, senior managers, engineers and members of different departments were involved in initial briefing. After three years of research on the adoption of WSPs in Uganda, Kampala and Jinja were chosen as pilot locations.

The WSP team comprised of members from the participating organizations who were chosen on the basis of their skills and involvement in water safety linked activities. The team was led by NWSC's principal analyst from the water quality control department.

6.5.2 Awareness and Understanding

All managers interviewed were aware of WSPs, some of them proudly pointing to the inclusion of their organization's WSP pilot in the GDWQ. Even branch managers were aware of WSPs, one of them indicating "We manage each branch as a business unit, we take into considerations all the different areas affecting the supply of water to customers, and water safety plans play an important role in this"(KII2). "WSP is about *protecting the water from source to tap"* **(**KII1). Another Branch Manager explaining what WSPs meant to them: *"At the branch level WSP means that the water we serve meets WHO standards"* and on their involvement in the process: *"Mostly involves technical department and the engineers who handle water safety" (KII3).* Among the non-managerial staff, employees at the treatment plant were aware of WSPs.

6.5.3 Implementation

NWSC has introduced WSPs to all its 23 branches. Explaining the implementation of WSPs in Kampala it was indicated "*It has been embedded in the way we do our things, we are developing a system where we are moving away from the population approach of looking at the end product"* (KII4).

6.5.4 Challenges

During the development of the WSP, *"we did not have up to date information on the system; the network maps were not up to date"* (KII6). Explaining the difficulties faced in implementing WSPs: *"Peoples' mindset has been a challenge because of the thinking that what you are doing might not change much because of the preoccupation with quantity"* (KII9). Further expounding on this point: "*WSP is a challenge because still from an engineering point of view they still don't believe water is both quality and quantity. That is why you will find an engineer laying pipes passing through a drainage system which is collecting waste water and you will find sometimes again a pipe close to an onsite septic tank, so if you were to consider what you are transporting should be*

of good quality then the idea of locating this pipe should have come into your mind. When your focus is solely on whether the water is reaching the customer then any path through which you lay your pipes is ok, and that is the challenge we have at the moment" (KII9).

"The issue of quantity is of higher priority than quality in developing countries and the successful implementation of WSP will require assistance in safeguarding water quantity" KII6. *"Planning ahead is required when putting in extensions, safety aspects need to be taken into account, and this is not being done"* KII9.

"We have no control over activities in the catchment area, and this is a big problem, both commercial and domestic activities are causing pollution. Sometimes the Land Commission issues land titles in reserve areas around the Lake, these areas are not supposed to be inhabited and were set aside for the protection of the lake, this is gazetted land, obviously this is not legal, and this is a problem that is affecting water quality because of the resulting pollution and it is increasing our treatment costs" (KII10).

"I think there is widespread disregard of the existing laws that are meant to protect the environment, ok there is population pressures and other social issues such as livelihoods, but issues like encroachment of wetlands if not addressed will have serious impact on our water source" (KII9).

Pollution of the water source was also mentioned as an obstacle to the implementation of WSPs. Explaining this point it was indicated: *"Water quality at Lake Victoria's Murchison Bay has been deteriorating because of pollution. We don't have adequate waste management systems to support the increasing population, commercial and industrial activities in the city increased volumes of urban waste entering the environment. Eeeh, sewerage and other waste drain into the Navikubo Channel which discharges into Murchison Bay. For example, partially treated effluent from Bugolobi Sewerage Treatment Works is drained into the channel. The wetland provided natural purification process for surface water before discharging into the Bay. This has been compromised by large scale draining resulting from human settlements and farming activities"* (KII9). *"On the water side our compliance is good, where we have a shortfall is on the sewage side, we are lacking in sewerage treatment plants and*

because of that it affects our compliance, sometimes the effluent does not meet the set standards" (KII6).

Some people have built on top of our pipelines, sometimes you might find a sewer line passing next or even on top of a water pipeline. So many service industries are putting their infrastructure where water pipelines are passing. People who are building or constructing roads, sometimes they cut our pipelines, so the issue of having a water safety plan, and having a sampling map, which is part of the water safety plan is very important. KII10

Other obstacles mentioned include "*difficulty in deciding where to locate your points because the valves are covered as a result of irregular maintenance"* (KII9). *"Resource limitations have also been a problem since the construction of monitoring points have been costly"* (KII6). In addition to these "*Land issue has also been a challenge because of people claiming land ownership in places where we want to construct monitoring points* (KII9).

When it comes to WSP training *"There are a few staff members who know the concept but they do not have enough time to train others, as a result training is inadequate"* (KII6).

6.5.5 Benefits

Notwithstanding the challenges, the staff members at NWSC are proud of their adoption of WSPs and the positive effect it has had on the organization's image. In addition to *"gaining a better understanding and knowledge of our* system" (KII6) the process is considered to be a more cost effective approach and *"a uniting factor between quality control and the engineers... only monitoring the product does not make you feel part of the system"* (KII9).

6.5.6 Looking Ahead

"The challenge with water supply, eeh, it's like saying the chicken and the egg which comes first, but for me I think for developing countries, first of all up to a certain point the government should not run away, the starting point is subsidy I think, so that the infrastructure is put to a certain level and then next, the prudent management structure

for the operation of that system, because however good you are as a manager, as long as there is no basic infrastructure you may not be able to do much" (KII4).

"For WSPs to be successful we need a change in thinking. For example, we need to work towards an integrated system among the various actors; it should not be about the quality people alone, we need engineers to be more aware of quality issues and take them into consideration when laying pipes and when dealing with leakage. As it stands, quality issues only come into the picture when there are problems, and that is when people start raising alarms and question why the problems exist"(KII9).

"The lesson I have learned has been more on the essential of water whereby quantity tends to overpower quality. When there is no water quality becomes a secondary issue, now, and that is a challenge which we have in developing worlds, how to keep the quality of something when what you are providing is not enough, so you end up going to quantity. We should change the way we think of water, we should look at water in terms of quality and quantity. And if you look at water as quality and quantity, you find the system has to be monitored, the system is all interconnected, but if you look at water as quantity only then you find the engineering aspect over powers the quality" (KII9).

"WSP should not be looked at as a tool for the chemist or lab technician only; that is where it is failing to take off. The engineers are not yet convinced on the necessity of this tool, public health officials are only concerned with product, but do not look at if the pipes are ok. This is where we need to do much, to see at how we can integrate the system" (KII10)

"WSP might also help influence policy and start linking with the catchment instead of only focussing on the consumers and the treatment" (KII9).

"The supporting programmes are inadequate; we need to improve on the focus of WSP. We need help in the sensitization of management and low cadre staff. You can't assume support is always there for programmes such as WSP, sometimes you have to be prepared for disappointments" (KII6).

"The biggest role consumers can play in WSPs is managing their waste at source for example by sorting the organic from other waste types, ensuring good onsite sanitary

systems such as lined pit latrines and also sharing information such as possible sources of pollution with engineers during the laying of pipes" (KII9).

"There is a local saying, which basically means seeing is believing; I think this idea of benchmarking should be encouraged so that managers can see how others are doing things. Perhaps there are certain things which you might think are impossible, but they are possible" (KII4).

The need for external auditors was also mentioned, it was felt that external auditors would provide a critical review upon which improvements could built. The external auditors it was said would require clearly defined standards: *"There is a lack of clearly defined standard for monitoring the whole system, a person who comes to audit your system, what standard are they using"* (KII9).

Investing in research was also mentioned as being the way forward: *"Given that the quality of our water is changing we need to invest in research and development, it is something that we really need to invest so that we can come up with appropriate and relevant technologies so that we can supply safe water"* (KII4).

It was indicated that combining the sewer services provided by the local authority and the Board would be more sensible. *"We need to look at ways of becoming involved in the managing of on-site facilities which is under KCC, that is, a combined approach to both sewer and onsite systems"* (KII9).

It was also mentioned that the WSP process and the organization's activities in general might be strengthened by having a member of staff on the organization's board.

6.6 Inside NWSC

In this section I will present employee perspectives on aspects such as organizational priorities, and changes, risk management and the organization's future.

6.6.1 Organization's Priority

Explaining the organization's priority employees made references to customer satisfaction, revenue collection and service extension. Some of their comments include:

"The organizations priority is customer satisfaction and revenue generation" (KII1). "*I think it is extending water services to everybody and having reliable service to the customers, that is the most important aspect of our operation, we need to serve the customer, reliable service!* (KII3). Others indicated: *"The focus is on putting the infrastructure in place and building human capacity"* (KII4). "*Since 1988 performance at National Water has been driven by focused programmes that target customer satisfaction and building a strong organization" (*KII5).

6.6.2 Significant Changes

Explaining significant changes in the organization, the main point of reference by staff members was the change of management in 1998 and the appointment of the new MD. *"When new MD came in it was at a point when the organisation was almost collapsing and about to be privatized. The new MD brought in lots of changes, first of all changing the perception of workers towards work, a new culture! People were lazy coming to work at 10; they were mainly concerned with how to make extra income in other ways"* (KII3). *"We tried to unfreeze the bad civil servant mentality, and so on you know, we were trying to make sure that people really know that they were there for business, reporting on time, doing the work right"* (KII5). *"There has been a shift from an engineering focus to customer perspective-creation of more business branches to ensure better customer service"* (KII9).

They described the change management programmes initiated by the new management (Table 6-2) in detail, with precision, and pride. "*Our short-term reform programmes were internally initiated by the organization itself, not externally initiated, but internally* [puts emphasis on the word internally] *initiated. This was guided by the religious adherence to change management principles"* (KII5). *"Commercialization elements came in driven by internal competition, new MD gave himself first 100 days to bring about some changes"* (KII4).

In terms of the positive outcomes of these programmes: *"The notion that only private operators can run a successful water utility does not hold water. Whether public or private what matters is the management of the utility"* (KII4). *"Incentives work; in National Water we have used incentives as part of drivers for improved performance"*

(KII6). For some, the new management opened doors "*People like us with marketing background have come into the system, where previously it was exclusive for men and engineers"* (KII3). The general feeling regarding changes in the organization, as put by one employee, was "*Changes have been for the good of the worker and the organization"* (KII1).

The extension of coverage and investment in the infrastructure was also mentioned and considered to be part of important changes that had taken place in the organization.

6.6.3 Internal Relations

The internal relations at NWSC were formal but not rigid. Staff members referred to their seniors using titles such as Mr and Dr. The managers were approachable by their juniors and conversations between subordinates and their seniors were relaxed.

Emphasis was put on the need for support from senior management for effective performance. *"With our operations if you are not supported by management you cannot win."* (KII3). Analogies were used by some to explain the relationship with senior management, for example, *"At the branches we are just like soldiers at the forefront vanguard, the managers at the head office are generals behind the scene and without their facilitation we cannot perform"* (KII3).

Some pointed to collaboration between units indicating: *"When we see things are not good, we get help from technical people"* (KII3).

Explaining how internal disagreements were resolved, the following comments were made: *"When there are disagreements on technical issues, engineers come in and if it is admin issues, commercial come in. The upper hand goes to whom the matter concerns. Most disagreements are on resource allocation where resource out of one department is shifted to another out of need. This is a result of working under limited resources"* (KII9).

"*Disagreements are part and parcel of our work and I want to say they are positive disagreements, not wars (laughs). There are multidisciplinary teams, there is a production team, a maintenance team, a quality control team, then there is the finance,*

and the human resource. There are different priorities and perhaps some of the priorities are competing, but at the end of it all, our ultimate goal is the same, and the person we are trying to serve is one, the customer, nothing else. So when there are disagreements, which are always there anyway, the first thing is, the person who is in charge will find out what is best for everybody, and what is the best way to enable us achieve our objectives. So in that way we look at what does team x want, and what does team b want and asses why the disagreements are there, is it on resource allocation, is it on priorities and is it in the timing, so in that case, the priority that enables us to achieve the ultimate objective is what we consider. There is always discussions, meetings and dialogue. We try to solve our problems form here and don't unnecessarily seek audience from the top, unless it is extra ordinary" (KII10).

"If disagreements cannot be handled within the unit, then it is taken to HR and if still not resolved then to the Union" (KII3).

6.6.4 Working for NWSC

The staff members at National Water were positive and proud of the organization and were happy to be working for it. There was also an indication that the organization offered merit based opportunities for advancement.

"National Water is a very dynamic organization, if a person is lucky to get a job with National Water you can only limit yourself, but otherwise with National Water the sky is the limit. There are many opportunities requiring diverse skills, you can leave one department and work in another department if you have the capacity" (KII10).

"Management jobs are open to any qualified person" (KII5). *"At the beginning I thought it was a challenge, branch management was previously dominated by engineers and all of them were male. But eventually top management came to realize that it was not the engineers only who can manage. Actually, engineers had a technical background and were not very good at commercial operations and management of credits. Bringing in people who had commercial and marketing skills led to positive changes in revenue collection"* (KII3). "*You keep management job for 2 years then you have to bid again, you need to meet SMART targets"* (KII1).

"The organization is challenging because expectations are high, but at the end of the day you feel happy because when you see your input and the success you feel gratified. You cannot say that you have done it and have reached the top. There should be continuous improvement and the better it gets the more challenging it becomes" (KII4)

Explaining training opportunities at National Water, employees indicated: "*In house everything is on paper but implementing has been difficult, of late training has been more focused on customer service oriented training and not on technical training. Technically, we train people as they interface with other colleagues who are more knowledgeable, there is no in-house training"* (KII9). *"Training is done but there is a need for better focus through staff needs assessment. The frequency and design of training can be improved"* (KII6). *"Training is good; we have a training centre for both internal trainers and external trainers. Training is on course"* (KII1). *"Training is done by the head office, customer care training, training in debt management, and training in operations and maintenance. There also are opportunities outside the country"* (KII3). "*Going abroad is allowed if you have a sponsor and it also comes with a guarantee that your job will be waiting for you"* (KII9).

References were also made to knowledge dissemination focus in the organization in terms of employees publishing in refereed journals and through other avenues such as booklets and papers. Explaining this, it was indicated "*We are helping other organizations to improve their systems by sharing the lessons that we have learnt.* (KII10).

One of the interviewees who was personally interested in different spheres of knowledge management made the following comments regarding knowledge transfer:

Knowledge transfer is really a big issue, when I was doing my research on risk management that is one of the risks I identified, that the system of knowledge transfer is not well developed and this is again based on my experiences. For instance people are sent for training, workshops, etc, and in all these they come back with literature, training materials, so in ordinary sense or in the ideal sense, the person who has been trained, because he is just an individual who can exit the organization at any time, but remember the organization has put in resources, so if this person exits without

disseminating this knowledge, then the organization loses, but the person will not lose. Now the system of knowledge transfer itself is not well developed because, peer to peer knowledge transfer, aah if a person comes from training he concentrates on his work, the literature may be available, but because first of all people don't have a reading culture, so the cds or the literature are shelved. The other way would have been for this person to organise an in-house workshop or training and make a presentation. Yes there is a requirement that you write a report to management about what you have learnt, but management does not compel you to write this report, so you can even escape the writing of this report and if it is written, I ask myself so what?, where does it go, maybe it is two or three pages, somebody might read it and delete it from his computer and it stops there. If knowledge transfer is to become effective, there can be something like a standing order that if you are sent for training for a workshop or etc, you should submit a report to management and also to the library. The library should share the contents of its repository and that way one can contact the author perhaps if they face a similar problem and knowledge can be shared. There is no central co-ordination of the available knowledge (KII10).

6.6.5 Risk Management

Among the interviewees 30% were comfortable in discussing risk management in the organization while the rest either deflected the question or indicated it was being dealt with by someone else. The perception of risks was broad, for example:

"The first risk I think which is there is our raw water source, I am not going to say that at one particular time we shall have no water, but I think the water is becoming more and more not readily available. First of all the climatic changes and then the regional water politics, sometime back the levels of lake Victoria fell, and the also there are so many competing users, the fall in level cost us a lot of money to improve on our intake. The quality also, the quality of the water is deteriorating, I don't think we can deal with it on our own; it will need regional coordination to see how we can protect the lake, given the pressures on the lake and the competing needs. As a corporation I don't think we can handle it alone. The other risk is, eeh, may be we are overzealous, the policies we came up with, it is like putting a rope on our neck, for example, aah, we came up with a free new connection policy, whereby we are providing free materials once you

pay a certain amount of new connection fees, but I think we have found that may be it may not be sustainable. We are also carrying free repairs on customer lines, we have a free service line maintenance, it is something which needs to be looked into. The other risk is, well it is in many places, the political environment, Africa being what it is, you never know, the political environment can affect our ability to deliver services." (KII4).

When it came to managing drinking water risks, an elaborate explanation was given indicating the implementation of WSPs (See Section 6.5). Some of the responses including those of branch managers, indicated: *"We have a way of looking at risks and water loss, for example, during the rainy season we have a high pressure build up and we have many bursts ... Some of these risks are mitigated in that we get a boost up team from the head office"* (KII3).

During a visit to one of Kampala's reservoirs I noticed a member of contracted staff washing himself next to a distribution storage tank (Figure 6-1). This activity seemed unnoticed by staff at the reservoir who carried on with their work.

Figure 6-4: A contracted staff member cleaning himself next to a distribution reservoir in Kampala. (Author, 2009)

On risk assessment it was mentioned "*We have a risk scoring system based on observations which is plotted on a GIS and a risk map created"* (KII9). On risk classification and prioritization: "*The prioritization of risks is based on parameters and their detection scored from low, medium to high. For example, cyst detection is high risk responded to by sand addition"* (KII9). On control measures (efficiency and necessity): "*Control measures are up to 80% efficient where they exist*" KII9. On water quality monitoring: *"We do random sampling of tertiary points, and 24 hours at the water works"* KII9. On emergency procedures: *"Emergency procedures are there but not for every process"* KII9. On communication and corrective action: "*Communication is ensured through Vehicle radio, email and web. For corrective action the operation group, technical team, engineers and quality control, and customers are informed*" KII9.

6.6.6 Organization's Future

Commenting on the organization's future the employees felt NWSC was headed for a better future. For example, *"The organization will be going to greater heights because we are moving step by step"* (KII3). *"We shall be a shining star, at the world standard as long as 1)The management is there and 2) We get government support* **(**KII1). *"National Water started with 3 major towns, but it is at 22 towns now. If nothing happens, at the rate at which it is growing I see this organization running the water supply in the whole country"* **(**KII4). *"If there is no backtracking, and if the political climate remains on the path of improvement, then in 10 years, 20 years I see, eeeh, really, National Water competing at an international level in terms of human expertise, in terms of opportunities, a lot of organizations are using us as a benchmark, if we continue at this pace I see us competing at an international level, also the financial base should improve, the population is growing and so is the customer base, we should be able to set up more infrastructure and create more jobs for Ugandans"* (KII10).

6.6.7 External Relations

The relationship between NWSC and its customers was generally viewed to be positive by both parties. Describing the organization's customers it was indicated *"The customers we serve can be categorized into commercial customers, residential,*

institutions, and urban poor. 90% are domestic customers most of whom are low income peasants. They are not the kind of customers who can pay their bills regularly or report a leak when they see one. They are farmers and craftsmen mostly" (KII3). Giving their views on customers' perception of NWSC, it was said "*The perception of national water compared to other utilities is good. The challenge is how to build up on that perception and the good-will of the customers such that you don't become complacent"* **(**KII4). *"Customer confidence in the services of national water I can say is high and that is why we work hard not to disappoint them"* (KII10).

There was a clear focus on customer service in the organization, the interviewees referred to the organization's slogan that encapsulates this focus "customer is king and the reason we exist" repeatedly. The commitment of the organization's leadership on customer service was also mentioned. For example, "*We always strive to give the best service to our customers and even the top leadership; this is its priority, the customer*" (KII10). "*The business belongs to the customer*" **(**KII1)

There was concern about getting feedback from the customers in order to address issues raised by customers and to avoid negative publicity for the organization. As put by one manager, *"Sometimes customers get annoyed and walk away; these are the worst kind of customers because they don't inform you of their problems and are likely to talk to their neighbours and others about their problems and the story spreads like a bush fire"* (KII3). During an interview at one of the branches a customer walked in saying he wanted to speak to the manager. After dealing with the customer, the manager explained *"There is a perception where people feel that it is only the manager who can handle their problem"* (KII3).

65% of the customers in Kampala indicated they were generally satisfied with the services they received from National Water. Customers indicated the services they received had improved significantly. Some of their comments include:

"These days we get enough water and the water is good, so I can say we are satisfied" (KCI2).

"Most of the problems that were there before have been dealt with and because of this we are happy. We don't ask for too much, as long as we are getting water every day and the water is clean then there is no problem" (KCI19).

"The staff are more friendly and you can talk to them if there is any problems. National Water helps with connections and because of these things we are fine" (KCI33).

Those who indicated dissatisfaction complained about availability of water in their area, response time to repairs and delays in connections as their main concerns.

Some of the interviewees from NWSC had the view that the relationship with customers could be improved. Explaining how to build and maintain good customer relations, staff at NWSC said: *"We need sensitization of both our staff and customers on how to handle each other"* (KII3). *"Customers need constant dialogue to find out their expectations and their needs and to be kept well informed"* (KII4). *"Sensitize them about what it takes to take that drop of water to their taps and how you value them, and ultimately that customer will reciprocate"* (KII1). *"We need to incorporate customers' expectation into our vision. There are times when these expectations are outrageous, for instance a sewer system request by one far off place customer"* (KII3). "*We work towards perfecting our operations and we expect to see results from the satisfaction levels of our customers*" (KII1).

When it came to trust, 70% of the customers indicated they trusted NWSC however, 85 % pointed out they did not trust the water they received from the organization. Explaining why they trusted NWSC, customer mentioned availability of water and good customer service as the main reasons. In particular, the issue of billing and payments was considered to be a main determiner of this trust, in the words of one customer, *"I am confident that they are doing their best and they will not steal money from me*" (KCI45).

As to why they did not trust the water, customers mentioned they were not sure of the water quality. For example, "*People boil the water or drink bottled water because they are not certain about its safety. We think it is better to be safe than sorry"* (KCI13). *"When your child gets sick from drinking the water then you cannot trust it. It is better*

to boil the water then you don't have to worry about paying for hospital or a sick child" (KCI29). Commenting on trust between NWSC and its customers, staff indicated "*We should be able to trust the customers and the customers should be able to trust us that we will give them reliable service. But sometimes distrust comes in also, you disconnect a customer for non-payment and the customer goes quiet, one year and he has not come, two years and he has not come. There is this man who is a manager in another utility company whom we disconnected and after a long silence we became suspicious and followed up on him. On visiting him, we found that he had made an illegal connection"* (KII3).

"Trust builds up, and you can only build up that trust if you improve performance. It is not always enough that you trust the customer. Control and monitoring measures are needed to ensure people are not using our services illegally. We have had cases where people are stealing our water" (KII4).

"*When it comes to our side, from a personal perspective I think when it comes to issues of payments, I cannot say we are very trusting of our customers, because they do not prioritize us, because we are lenient to them they think they can pay our bill after paying the electricity bill*" (KII10).

"Customers want a good service as in reliable supply and acceptable cost. The more you improve the more trust they have in you" (KII4). *"Customers have to have trust in us that the service we give them is of good quality, our water is well treated and good for human consumption. At the same time we have to have trust that our customers will pay their bills and not tamper with our equipment"* (KII1).

When asked to explain the mistrust of the water provided by NWSC and the high number of people who felt the need to boil their water despite Kampala water being sold as "safe for consumption", the following comments were made: "*Failures on our part also creates mistrust*" (KII3). *"Customers don't trust our product*" (KII10). "*People rinse their mouths using tap water but then avoid drinking it without boiling it first. We do not ask people to stop boiling their water because of the way we transport our water. The problem can occur as water enters their houses because 87 % of the population use onsite sanitation where they have septic tanks, pit latrines and other areas where they*

even have no toilets. Because of risks of leakage and contamination we tell them you can still boil the water, but the water is safe" (KII9).

Educating the customers was considered to be an invaluable aspect in achieving the organization's objectives. For example, "*Educating the customer means increasing our success levels"* (KII1). "*We value educating the customer, when our team goes to the field they interact with the customers and educate them, giving tips on how to keep water safe, Flyers are used, tours from universities, schools and other institutions also offer opportunities for educating the customer"* (KII9).

One aspect of customer education emphasized by employees was good hygiene and safe water handling. Some of the issue raised are summarised below:

1. *"Ensure storage tanks are clean and well covered"* (KII3)
2. *"Keep an eye on people who vandalize water network such as valve thieves. This is linked with water contamination and service costs"* (KII1)
3. *"If you see a burst please inform us"* (KII4)
4. *"Not to construct any structures on top of the waterlines and to inform us in case of such constructions"* (KII1)
5. *"Not to build septic tanks on top of water lines. "There are cases where you have water line hanging on top of the septic tank!"* (KII1)
6. *"To keep pit latrine construction away from water lines"* (KII9)

Explaining the relationship between the government and NWSC was a bit sensitive. Comments on this relationship included: *Sometimes there is, eeh, what should I call it, they call it political guidance, whether it is interference or intervention, it is always there, but not so much. We have to appear before parliament annually, sometimes they can bias you on where to take service, not on a national level, but at an individual, constituency level. The Board is also appointed by, eeh, it is a political board*" **(**KII4). *"Politicians insist on service extension to certain areas despite lack of capacity and as a result demand becomes higher than supply, leading to rationing and creating risks to the water system, the product itself. And the network because of backflow related risks, stagnization, and air lock risks, all are affecting the operation; trying to satisfy a*

political push without having the necessary capacity to cater for an increase in demand leads to new risks. The accommodation of such political interferences might also lead to diversion of funds and causing problems elsewhere" (KII9). These narrations give credence to media reports commenting on "influence peddling by politicians" which indicate "The national effort to improve water supply and sanitation facilities equitably is also distorted by interference with budget allocations to favour areas where politicians hope to gain political mileage ..." (The East African, 2009).

On the relationship between NWSC and the international organization's promoting WSPs, interviewees thought they had a good rapport. Explaining this relationship, it was commented: *"They consider us as a role model being the first African country to implement WSP. They consider us as people who have succeeded in the implementation of WSP although we are not done fully. Not because we don't want to but because of priorities. This is a system which was already in place and we are bringing in a new approach which requires you to monitor the system. In some areas such as the monitoring of the pipes, it is expensive because it involves the construction of chambers"* (KII9).

In terms of working with international development organizations it was explained: *"On the positive side they may have outside knowledge to share covering similar issues that we may be facing, exporting of knowledge, on the negative a foreigner may not know the cultural aspects which are dependent on local contexts"* (KII9). *"First of all they are very welcome, but for me I think they should not dictate so much, really, it should be more of a dialogue, they should try and understand what they are trying to help with. Sometimes they come up with conditions which may not be in the interest of the recipient, and then at the end of the day the impact is not felt. We need their expertise, but their expertise does not work in a vacuum, they should know that there are local conditions and the social-cultural aspirations of the people, for me I think if they can understand that, then it can work out basically"* (KII4).

It was also felt that international development partners could provide "*assistance in securing quantity which will ease quality issues*" (KII9). There was also an indication that international development partners could use their influence to facilitate the

implementation of required parameters such as policies *"The donors can dictate, we need somebody big up there for things to move, that is African culture"* (KII9).

On improving this relationship, it was explained *"Part of the reason foreigners get involved in project implementation, it might be attached to the source of funding, let's say if the funding comes from Germany you can't avoid having a foreigner on such a project because definitely they have their own interests which they want to protect, so they have to second a person they trust to be on that project. But, what is my perception of this whole matter, my perception is, yes, since they have given us the money and say they second a consultant, it should stop there. But if I look at my experience, we have been, at some time, almost coerced to understand that we do not have the experience and the expertise to undertake some activities, there actually have been suggestions from them to even fly people here to do the task, yes the technology might be advanced for us, but we have the brains to understand this technology, so you don't need to bring a foreigner to come and do the job, you send me for training and I come back and do the task"* (KII10). *"We had a contract with an international organization, the problem with some of these organizations is that sometimes they come with a fixed mind, and they fail to appreciate the local conditions. There is also a positive side because sometimes you can tap into their expertise, but it only works well when you are focussed and you know what you want"* (KII4). At the same time there was an indication for the need of more involvement from development partners, for example, "*International organizations give us tools and ideas, but facilitation has not been there"* (KII9).

6.7 Challenges Facing Utility

Despite being endowed with a conveniently situated significant freshwater resource NWSC faces several challenges in supplying ample quantities of safe water to Kampala's residents. Explaining the challenges faced by the organization, staff indicated: *"Despite a growing population our network is almost the same and it is stressed as a result. We need a long term program to upgrade our networks" (KII3). "We need to expand the network, ensuring enough supply from the source; all this is needed to cater for population growth* **(**KII1).

Figure 6-5: A woman fetching water from a drain in Kampala's Kisenye area (Author, 2009)

Employees attributed NWC's inability to fully meet its obligation of providing water and sewerage services to lack of financial resources. For example, *"We aspire to satisfy the need of the customer, focus on what customer wants, but the lack of resources means a dilemma"* **(**KII1). *"Working for this organization is a challenge because working for a service industry is a bit tricky; it is a difficult business in that customers take utility organisations like us to be providing water, a gift from God, which should not be paid for, and that we are a government owned body, and therefore we should have free offerings, or perhaps subsidized"*(KII3).

Kampala's NRW as at June 2009 averaged about 42.9% (NWSC, 2009). This high rate of NRW is attributed to leaks and bursts in the network, illegal connections, and inaccurate meter readings. NWSC is also dealing with high arrears among its customers. For the period ending June 2009 the corporation's total arrears were Shs 41 billion[4] (NWSC, 2009). 45% of the total arrears were from government ministries and 31% from domestic customers.

Explaining the difficulties the organizations had with receiving water payments, it was indicated: *"Some customers don't want to clear their bills, even among some of those who have the money. The culture is to view water as being free"* (KII2). "*The most*

[4] This amount is around 15.5 million US dollars (based on Dec 2012 exchange rates).

difficult aspect of this business is the willingness of customers to pay their bills. Our outreach to the customers, we need effective outreach to the customers because our people need to be pushed to pay their bills. Because of this we should have more field staff than desk officers (KII1). *"Some customers don't prioritize paying their water bills because we are so lenient, we treat them with a parent's hand. So when a person gets a bill for water and a bill for electricity, he would rush to pay the electricity bill because the electricity people don't compromise. If they come for you they will definitely disconnect you and to get back the service you will perhaps spend more money"* (KII10).

The organization is taking various steps in rectifying this situation such as disconnections and legal proceedings to secure outstanding fees. It was explained "*Head office has also been able to recruit temporary workers, 6-8 workers to help in arrears reduction*" (KII3). It was also pointed out *"It is important that we differentiate between willingness and ability to pay. I think we need to reconfigure tariffs to accommodate ability to pay, catering for urban poor"* (KII4).

In the media there are many stories on how well-off segments of Kampala's residents are failing to pay for the water they use. One such story is shown in Table 6-6.

Table 6-6: How Kampala Tycoons Steal Water (Daily Monitor, 2011)

The urban rich and city business are the biggest defaulters and pilfer piped water by bypassing or manipulating water meters. Reports from the ongoing clampdown on defaulters or those with illegal connection of piped water dubbed Operation Wet Storm indicate that the biggest culprits are city tycoons, private schools, hotel owners, hostels, and Members of Parliament. "We have even a church in Nakulabye being run by Americans. We have caught lawyers, Members of Parliament and these are businesses and people who have the money," Ms Vivien Newumbe, the NWSC publicist, said."

Over 90% of both customers and NWSC staff thought corruption was a widespread problem in Uganda. Some of their comments include: *"Corruption is widespread in Uganda and many other countries, and its effect is more visible in developing*

countries" (KII7). "*When you have these big diseases which infect people like AIDS and cancer, you die a slow and painful death; corruption is destroying us like that"* (KCI49). Among the customers, 65% indicated they had direct knowledge of corruption involving NWSC's staff. When asked how corruption affected the water services they received, customers gave different narrations of corrupt activities for example: *"A friend of mine had no water meter and the water people found out, but he paid them and they kept quiet"* (KCI8). *"Water bills are sometimes very high, but if you pay the problem can be fixed"* (KCI19). *"My brother was building a new house and it was taking too long to get the water connected, after he paid somebody 100,000 shillings he had his connection"* (KCI42). NWSC staff were not willing to discuss any corruption cases involving their colleagues indicating they did not want to interfere with ongoing cases.

All the interviewees from NWSC appreciated the problem of corruption involving staff. They mostly attributed this problem to frontline staff and were quickly to point out that the organization was doing its best to address the issue. Some of their comments include: *"This is a tricky one. Ok, there are cases where our field staff have been implicated in corruption. These have been dealt with accordingly. National water is taking all the necessary steps to prevent this problem"* (KII4). *"We know there are some cases of corruption involving our staff, but if a customer calls and says a staff member wants to extort money from them, they will be listened to and actions will be taken. They can even easily talk to the executive manager"* (KII10).

There are various media reports corroborating the assertion of NWSC's anti-corruption activities. For example, "Uganda: NWSC Employees Face Sack for Soliciting Bribes" is a story in the Daily Monitor (2009) which explains: *"Ten National Water and Sewerage Corporation (NWSC) employees face the sack for allegedly soliciting bribes from clients. NWSC Managing Director William Muhairwe says 50 other employees will be rewarded with promotions for refusing to take bribes. "We recorded their voices as they were negotiating bribes with our clients and we are going to discuss their fate at a managerial level," he said. "But considering the gravity of the matter they cannot survive sacking because they have tainted the corporation image.""* (The Monitor, 2009)

However, a recent World Bank sponsored baseline survey points to corruption that goes beyond the meter readers. The report co-authored by Ministry of Water and Environment (MWE) in partnership with the secretariat of the Water Integrity Network (WIN) and the Water and Sanitation Program in Uganda (WSP-Uganda) indicates that: *" ... between $5 million and $10 million meant to improve access to safe water for drinking in Uganda is lost to corruption annually... between 10 and 20 per cent of money given to contractors is spent on kickbacks, which significantly reduces the extent to which the contract can deliver on improving access to safe water and sanitation"* (The East African, 2009).

Another media story carried in The Monitor (2010) reports on the arrest of journalists among its staff members over allegations to extort money from NWSC's director. This story shown in its entirety in Box 6-1 gives a clear picture of what is happening behind closed doors and the extent of the problem.

Other challenges facing the organization mentioned by staff include land ownership, employee turnover, control over the catchment and urban planning. For example, "*One of the challenges right now is, as much as National Water offers opportunities, the competition for expertise and strategic, highly qualified personnel is becoming tight in the market and this has become a challenge for National Water, I am saying this from what I am observing, the labour turnover, the way people are leaving. If you are losing highly trained and highly qualified strategic people, getting them from the market and replacing them is not simple. The retention of highly qualified people is becoming a challenge. One of the reasons why people leave is, definitely they compare the remuneration. The remuneration of most of the engineers, especially if you are at a junior level, is, eeh, you can get something better in the private sector"* (KII10).

"*Land ownership presents a challenge in the laying of pipes. For example, when a sewerage line goes through a privately owned land, laying of the pipe becomes problematic despite the existence of legislation giving precedence to public service provision over individual interest"* (KII9).

Box 6-1: Allegations of Extortion (The Monitor, 2010)

The parliamentary police are holding two Ugandan journalists, including a Daily Monitor scribe, over allegations that they tried to extort Shs40 million from Dr William T. Muhairwe, the managing director of National Water and Sewerage Corporation (NWSC). The second suspect identified himself as an employee of Akaboozi radio, a sister station of Radio One. The suspects were on Tuesday paraded before the parliamentary oversight committee on Commissions and State Enterprises, chaired by Aswa County MP Reagan Okumu. "They used our committee name and said we would treat the MD (Dr Muhairwe) very well when he appears before us," Mr Okumu said. "They even said Gen David Tinyefuza, the coordinator of Military Intelligence, was annoyed with Dr Muhairwe". Dr Muhairwe told the committee he had sleepless nights over the numerous calls he received from the suspects until he alerted Parliament, which eventually sent in their detectives. "After we presented our defence on many queries before the committee, I begun receiving delegation after delegation from the media fraternity, claiming the MPs had sent them," Dr Muhairwe said. After the arrests by Parliament police, the Akaboozi radio journalist sent Dr Muhairwe an SMS message that read: "For all I have done for you, you pay me like this...okay, thank you, we shall meet." Another suspect who escaped arrest sent Dr Muhairwe an SMS, reading: "May God be with you. Am loosing my job because of you. Thanks." Dr Muhairwe said his life could be in danger over the arrests. He said the journalists used Makindye East MP Michael Mabbike's name in their mission. Last month, Mr Mabikke tabled allegations, which he claimed were from a whistleblower, implicating the water boss over several misconduct, including misuse of money meant for the GGgaba Water Project. NWSWC was also accused of supplying water contaminated with seweage. "I didn't believe them (suspects) when they said Mabikke has sent them," Dr Muhairwe said. Dr Muhairwe said when police was called in, they stationed a recorder in his office, photocopied all the notes he was giving the journalists and then arrested the two as they walked out from his office with money in envelopes. "The Monitor journalist told me he was the editor of Weekly Mail and he would stop any more stories brought by Mr Mabikke to tarnish my name. He said he had already stopped two stories," Dr Muhairwe said the Akaboozi radio journalist claimed he controls all contents that is aired on all radio stations. Mr Daniel Kalinaki, the Daily Monitor managing editor, said although he was disappointed by the arrests, he was happy to note that the public was becoming more vigilant and more willing to expose such journalists. This comes just days after two journalists and a city lawyer were arrested in a racket that attempted to extort Shs50m from Works PS Charles Muganzi.

"*The Catchment is outside of National Water, we have a Ministry of Water that deals with it, we have no control over it. For example, in case of illegal settlements which lead to increase in treatment costs, we give evidence to the ministry and they make the decision*" (KII9).

"Then also the planning, some of these settlements have not been planned for, you have these population explosions and you are expected to provide services and of recent we have seen that even our mandate is going beyond our gazetted supply areas, originally are only supposed to supply urban areas, so where is the cut-off point, we are being stretched basically" (KII4). *"Also there is a need for ample road reserves and the proper design of the network"* (KII1).

6.8 Conclusion

Majority of the participants used ethnicity as the main descriptor of their culture. Cultural perceptions and uses of water were made with references to religion and spirits. Linked to these perceptions are beliefs linking the beginning of life to water and beliefs that water is not a commodity. Also related to these perceptions is the use of water in rituals. Despite participants indicating use of aesthetic aspects in judging the safety of their water, 80 % of them mentioned boiling it before drinking. Notwithstanding Kampala's proximity to the world's second largest freshwater lake, most of the residents do not get regular supply and as such rely on stored water further increasing contamination risks. Obstacles towards the implementation of WSPs are linked to issues within the organization and matters arising from the interface between the water utility and the society.

7 SPANISH TOWN CASE

7.1 Introduction

This chapter presents findings from semi-structured interviews, field observations and document reviews on the Spanish Town WSP pilot project. The presentation of the findings begins with a description of the location and its people taking into account aspects such as their culture and perceptions of water safety. This is followed by a brief account of the areas' water utility and details on the water supply system. After this, a full description of the WSP project is provided covering aspects such as how the idea came about to suggestions on ensuring its success. The last sections of the chapter revisit the water utility and examine the internal workings of the organization and the challenges it faces.

7.2 Location and People

Spanish Town is located in south-eastern Jamaica and is part of the Kingston Metropolitan Area (KMA). Situated 16 km west of Jamaica's capital Kingston, Spanish Town is administratively included in St. Catherine, the third largest parish in Jamaica.

Figure 7-1: Map of Jamaica (Encyclopaedia Britannica, 2000)

Founded in 1534, the town was Jamaica's capital from 1692 to 1872. The town is among the fastest growing areas in Jamaica and its estimated population for 2010 is 148, 367 (NWC, 2011). Spanish Town comprises of a mixture of residential, commercial and industrial areas.

The town is a World Heritage Site which among its many treasures boasts of having the oldest iron bridge of its kind in the Western Hemisphere standing near the town`s entrance. Most of Spanish Town residents are descendants of African slaves who were taken to Jamaica to work in the sugarcane plantations. English is the main language among the town's Christian majority population.

7.2.1 Description of Culture

Nearly all the participants from Spanish Town used their nationality as their first and second descriptors of their culture. 94% described their culture as being Jamaican in the first instance while the remaining 6% used religion. In their second description, 80% used their nationality while 4% and 16% used their religion and locality respectively. Examples of these descriptions include "*My culture is Jamaican*" "*I would say Muslim*" "*I have Negril culture*". Nearly half (48%) of the participants also explained their own identities by mentioning the ethnic origins of their grandparents or ancestors.

7.2.2 Cultural Perceptions and uses of Water

The cultural perceptions of water were mainly secular in nature. 70% of the participants related their cultural perceptions of water to daily essential activities and leisure activities. Some of their comments include:

"Water is something that we use every day in life" (SCI25).

"Water is seen as a necessity for life" (SCI18)

"I never thought of water in a cultural way, you know like food, but we see water as water, something that you need to live, something that you use for fun, or even to make money, you know like the tourist coming to enjoy the beaches" (SCI47).

"We see water as a liquid for drinking, cooking, washing, cleaning, playing, farming, usual things in life you know"(SCI31).

30% of the participants used religious language in describing their cultural perception of water. Most of their comments linked to the relationship between life and water. In addition, they also made comments as to the spiritual and physical cleansing aspects of water. For example, they mentioned:

"The origin of all life is water" (SCI10)

"We get baptised in water, just like Jesus, and this marks the beginning of a new life" (SCI25)

"We use water every time before we pray to perform wudhu; the water has to be clean" (SCI12)

Following up on the usage of water in Hyderabad and Kampala mosques I visited the local mosque in Spanish Town. The care taker at the mosque explained the significance of water from a religious perspective. "*We believe all living things are created from water. We use water to stay alive in body and spirit. Before we pray we perform wudhu here.*" (SCI11) When asked about water usage in the mosque, he explained "*Many people run the taps more than they need to, people use more water than they need*" (SCI11). Quantitative assessment (Appendix C) of ablution water use at this mosque showed usage of up to ten litres and an average of five litres per ablution.

When asked to describe how paying for water was viewed in their culture, 65% of the participants indicated water was considered to be a not for sale item. Some of the comments explaining this included:

"Water is like air we breathe, people need it for life it should not be for sale" (SCI5)

"I pay my electricity bills, I am a believer. Taking electricity without payment is like stealing. A lot of people steal electricity." What about water? *"Water is different. People should not be paying for water; this is a gift from God. No water, no life!"* (SCI29)

"Water should be free" (SCI34)

"The water company is profiting from water, this is wrong, nobody should be making profits from something like water" (SCI47)

Only one customer admitted to never paying any water bills, he revealed he had an illegal water connection which he said would cost about 1000 Jamaican dollars for a plumber to do if one supplied his own materials (SCI2).

7.2.3 Water Safety Perceptions and Storage Related Practices

90% of customers in Spanish Town considered their water to be safe for consumption. They attributed their perceptions to improvements in their water supply linked to new infrastructure. For example, *"The water commission is much better than before, even during the droughts now we have no lock-offs"* (SCI17). *"They have a bigger catchment; we have good water all the time now. Before the pressure used to be low and people got sick"* (SCI13). The link made by customers between their perception of safety and the improvements in the infrastructure was acknowledged by NWC staff who felt happy. As one manager put it "Luck is on our side".

However, 30% mentioned using supplementary treatment before drinking tap water (10% used filters and 20% boiling). 70% of those who boiled their drinking water mentioned the process improved the taste. The main issues of concern with water safety as pointed out by most customers were the aesthetic aspects of colour, smell, and taste which they mostly used in judging the safety of their water. For example, they indicated:

"I don't like to drink the water when it is cloudy" (SCI20)

"Safe water has no smell" (SCI15)

"When the water is good it smells fresh" (SCI25)

"Sometimes they put too much chemicals in the water and the water smells like bleach, good water should not have any smell" (SCI40)

"I don't like the smell of chlorine; too much chlorine can be dangerous (SCI50)

"Safe water does not smell or taste like chemicals" (SCI43)

The sound of water taps was also mentioned by one customer who indicated: "*When the water is safe, I can tell from the sound of the tap. The days when the tap starts making funny noises I know that day water is not safe"* (SCI13). Relating this story to the treatment plant manager he indicated that they had been having problems with water pressure.

60% of the customers had elevated tanks for water storage which they mentioned cleaning regularly. All the customers mentioned storing their drinking water. The most common vessels used for storing drinking water were lidded containers used by 92%. Only 4% of the customers stored their water in uncovered wide mouthed drums. 8% of the customers indicated they boiled their drinking water prior to storage.

7.3 Water Supplier

Nearly all of Jamaica's population has its water supplied by the National Water Commission (NWC). In addition to NWC, there are several other agencies involved in the country's water sector. The Water Resource Authority WRA is in charge of regulating, controlling, and managing Jamaica's water resources. For instance, it is solely responsible for permitting water abstraction**.** The Office of Utilities Regulations (OUR) is responsible for service standards and setting of tariffs**.** Other agencies include the National Irrigation Commission (NIC), the National Environment and Planning Agency (NEPA), and the Ministry of Health which is involved in water quality monitoring.

Like most other Jamaicans, the residents of Spanish Town are also served by the NWC. This statutory body, formed under The National Water Commission Act of 1980, is charged with the responsibility of providing potable water and wastewater services for the people of Jamaica.

NWC is headed by a nine-member Board of Commissioners appointed by the portfolio minister (water and housing). The board establishes policy and gives general direction

to the organization. Operationally, NWC is headed by a president and deputized by vice presidents. NWC has two operating divisions: Eastern and Western. Each Division is headed by a vice president and consists of four Areas headed by Area Managers.

The Commission's mission is**:** "to provide the highest quality potable water and wastewater services, maintain good working conditions and good corporate citizenship while protecting the natural environment and contributing positively to national development. Its vision is: "to be recognized as one of the best providers of water and wastewater services in the world, based on our superior service, efficiency, viability, integrity, innovation and teamwork."

7.4 Water Supply System

7.4.1 Water Sources

Spanish Town relies on both surface and ground water sources (EEM, 2007). Surface water comes from the Rio Cobre River. The 52.2 km long Rio Cobre River is part of the Rio Cobre basin which is sub-divided into the Upper and Lower Rio Cobre. The two main aquifers in the basin are limestone and alluvial aquifers. Water from the river is diverted into an open channel canal by the National Irrigation Commission (NIC) at the Rio Cobre Diversion Dam to provide irrigation water for the South St Catherine Plains and to supply Spanish Town with domestic water. The diversion of flows is managed by the NIC; the NWC requires permission from the NIC to abstract water from its canal.

The average daily supply from the Rio Cobre to the irrigation canal is 368, 000 m^3 out of which an average daily rate of an average rate of 11,365-13,183 m^3 is abstracted by the NWC at the Spanish Town Treatment Plant (Smith, 2011). Ground water is obtained from ten primary wells located in the Western Limestone Aquifer of the lower Rio Cobre Basin. These wells are: Ariguanabo Well, Angel's #1 & 2 Well, Chung's Well, Brown's Well, Ensom City Well, Friendship Well, Golden Acres, Twickenham Park Well, and Yang's Well. The estimated combined average daily output of Spanish Town's supply sources is 53, 189 m^3 (NWC, 2011)

7.4.2 Water Treatment

Water drawn from the canal is treated at the Spanish Town Water Treatment Plant located adjacent to the canal. The plant's intake works has three pumps. The treatment process at the plant involves screening and aeration, coagulation and flocculation, filtration, and disinfection. The plant uses chlorine and alum in its treatment process. The raw water drawn from the canal has high turbidity, records from around the time of this study indicated turbidity to be varying from 20 NTU to a high of 150 NTU.

Prior to recent upgrades, the plant could not cope with turbidity greater than 30 NTU and as a result it was out of service for an average of 40% of the days per year. These high turbidity levels were attributed to agricultural activities upstream and torrential rainfall. All well water is chlorinated prior to entering the distribution system. The dosage is set to achieve 2.0 mg/L residual chlorine level in the water leaving the facility.

7.4.3 Water Distribution

The distribution network supplying Spanish Town and the surrounding areas is made up of trunk mains and branches to interconnected distribution zones (EEM, 2007). The network is described as being complicated and is thought to include the early system dating back to 1836. The distribution mains supplying the area, according to a 2002 inventory, had a total length of 312.6 km (EEM, 2007).

The distribution system has a mixture of different types of pipes including cast iron pipes, ductile iron pipes, polyvinyl chloride, and asbestos cement. In the system assessment conducted prior to ongoing rehabilitation several items were marked for replacement or rehabilitation including old isolation valves, aged mains, source meters, relift pumping stations and booster stations, reservoirs and storage tanks.

7.5 WSP Project

7.5.1 Drivers and Description

Spanish Town was selected to be a pilot after a PAHO, CDC, and USEPA led workshop in the LAC region. During this 2005 workshop, Jamaica's representatives suggested Jamaica to be the pilot site for the region. The decision to select Spanish Town as pilot area was influenced by the challenges faced at its water treatment plant and the adverse effects of human activities on its water source's large catchment area. The Spanish Town WSP pilot was to serve as a model for other countries in the region.

In the beginning of the process there was some reservation towards adopting WSPs, nonetheless, as the process was comprehended management became more receptive: "*When we started the process, there was, reticent, there was a view that we are already doing most of this, different agencies have this role to play, the question was to what extent were they doing what they should do and so we wondered whether the WSP was really adding anything"* (SII2). However, *"As we understood more about it we said you know what, we certainly cannot lose by going through this process"* (SII2).

After decisions were made to pilot the WSP, the promoters promptly got the process started: "*So immediately, we had representatives of the partnership coming to Jamaica CDC, USEPA, PAHO, coming to work with Jamaica, they started training workshops and it went through various processes, then we had to look for the stakeholders, it was wide multi-sector, cross agency and all partnerships"* (SII9).

Following consultations with key stakeholders, a joint task force, comprising of the utility and several government agencies including NIC, NEPA, and the Ministry of Health, was formed. In establishing the pilot, the team followed the GDWQ guidelines. However, the team was faced with obstacles such as lack of time and as a result. *"So we wrote to the partnership, the CDC, USEPA, PAHO and we said will you allow us to engage a consultant to guide us, to lead the process, and after a little bit of to-ing and fro-ing we got approval and that is when a consultant was engaged* (SII8). A consultant was engaged to coordinate the activities of the team *"because none of us as employees would have the time to do this work*" (SII9). In engaging the consultant the

individual's qualification, interpersonal skills, and acceptance among the team members were given a lot of weight.

The development of the WSP was delayed for six months because of Presidential elections in Jamaica. The political campaigns along with changes in the Ministry of Water affecting personnel and other aspects contributed to this delay. After a new government was formed the new minister of health made a public statement indicating commitment to the process during a regional WSP workshop. The piloting stage came to an end in November 2007.

7.5.2 Awareness and Understanding

At NWC matters concerning WSPs were dealt with and limited to middle managers and the plant manager at Spanish Town. There was clear understanding of the process, and in fact some of the managers had made presentations at WSP workshops and conferences. Junior employees at the treatment plant were aware of or had at least heard of WSPs. One plant worker indicated "*WSP is that thing they were doing with identifying hazards*". As indicated by this "*People are extremely happy to learn the concept and to try and put things in place"* (SII8), the new knowledge was appreciated.

7.5.3 Implementation

After the WSP was developed the NWC embarked on implementing the plan. The construction of Spanish Town Water Treatment Plant and the accompanying improvements to the supply network addressed most of the identified risks and hazards. The implementation of the WSP was made easy by the fact that the identified problems had been variously mentioned or noted previously and the WSP was providing a connected method of resolving them. *"The water supply company had already taken some management decisions to improve their operations, build their human capacity, construct new infrastructure, upgrade that particular treatment plant so a lot of what the plan was saying needed to be done was already in train ..."* (SII9).

Following the completion of the pilot different strategies for scaling up the process were considered. For example, *"There was agreement in the Ministry of health that this*

needed to be replicated island wide and they took the decision to incorporate it in our national drinking water regulation which goes back to what I was saying that it has to be built in legally into the system" (SII8). Steps taken also included awareness creation for example, "*We have had a number of seminars, a number of workshops and programmes to introduce both a wide cross section of persons in terms of the whole process, what we hope is we can continue it to a large cross section*" (SII2).

7.5.4 Challenges

In Spanish Town winning the support of the executive management was initially a challenge, however, this was overcome through patience and communicating the essence of WSPs. Gaining an understanding of what WSPs were and the benefits it could bring made management more receptive. The coordination of meeting dates among the WSP team members also posed difficulties to the process. Towards the completion of the pilot meetings had become less frequent, *"We have not met for some time now"* (SII1). *"I think the most difficult challenge is the continuation in other words getting everybody to understand the concept to understand that it is important but there may be a cost component and that it will require proliferation over time and I mean we have not really met as a group for a while*" (SII2)

Also there was a problem with the timely receipt of reports and completion of assigned tasks, *"having so many people working together towards any common good is not an easy challenge and so I think that is part of a great challenge and as to whether it will be successful in terms of implementation is a question"*(SII9). *"Everybody has a fulltime job to do; getting the group together at any one time becomes hard"* (SII3).

Setbacks related to data availability and accuracy were also mentioned *"It has been hard to get readily available data, also the accuracy of the data, sometimes the data is not accurate"* (SII3). Data required to inform the process was lacking at times such as pollutant loading from effluent discharged into the Rio Cobre through industrial and agro industrial activities. In addition, "*Sometimes the data is there but there is no time to analyse the data*" (SII4).

In addition, educating the public on the impact of their activities on water safety was considered to be a challenge by several managers. For example: "*I think one of the biggest challenges is getting across to people the importance of their lifestyle, all lifestyle I mean the living conditions, the working conditions, their farming conditions and its effect on safe water*" (SII4). *"We need to stem the problems resulting from deforestation, improper agricultural practices, unplanned settlements and all the issues that flow from the land towards the main environment because if you manage what happens upstream you should have very little to do downstream. You have to realize that environmental management is people management as well and that is the hardest part changing people's behaviours and ways of thinking"* (SII10).

There was also an indication of more emphasis being put on water quantity issues over water quality issues: *"Where we are currently falling short especially, is where water quality management is concerned we have been focused more on water quantity management, so we know how much water is where, how much we can take from rivers, how much we can take from wells, for various uses, but our budget for monitoring quality has been cut significantly"* (SII9). *"The safety issue would be better achieved if the engineers had the same concerns, it would make a difference"* (SII2). *Water quality is an unseen problem, you can tell your boss water is leaking, what you can't see is harder to justify, they might be seeing pretty clean water"* (SII3).

Challenges linked to the catchment were also mentioned. For example it was indicated *"Some of the industries, commercial farmers and small businesses, they engage in activities that pollute the water..."* (SII3). When the author raised this issue with the responsible agency, they indicated: *"Some of the industries upstream of the plant are not adhering to the emission standards; we are having challenges in monitoring and enforcement because of our capacity levels"* (SII8). *"Part of the difficulty and am not making a criticism is that you would have wanted environmental agency to have been more active but then it has to come from leadership and commitment"(*SII9). Explaining how they were going to tackle this challenge: *"There are plans to have someone assigned directly to the watershed in some specific geographical areas, Spanish Town, that catchment area is going to be receiving attention and I think we*

have earmarked some funds already. I have raised it with the Water Commission, because it will need their collaboration" (SII9).

In addition to pollution by licensed businesses, *"You also have some informal activities, like carwash, cookshops and garages who dump their waste into the canal"* (SII3). When it comes to dealing with informal activities: *"I am not going to make any prediction but I will suspect that we are going to be taking some firm action"* (SII8).

Explaining the approach used to deal with pollution from informal businesses, it was explained: "*That has been a difficult thing, a big problem for a long time and the challenge with clamping down, because we consider it to be little people, we are aware, but it is a difficult problem to fix, the only way to fix that problem is to get the people to recognize that they need to stop. Trying to police something like that is not going to work because you can't be there all the time, so that has been the approach, has it been effective? That remains to be seen. Every time we work in a particular watershed we usually engage people in that sort of thing but the moment the NGO or the unit that deals with it leaves then you have the problem coming back so it is really difficult problem but we do recognize it* (.SII10).

The impact of political influence and interference on enforcement capacity was also raised: "*As far as the political side is concerned, it has an effect. A lot of times when you try to make changes that benefit health and the environment, what you find happening is that there are issues. For example, if you try to remove certain section people, aah, let me give you an example, we have an area, there was a time when we were in ... the people in that area were affecting the water quality in ... and it was very difficult to remove the people even though there were serious health implications and it was ..., it rested somehow on political issues. If you try to disrupt or to remove a community out, you know what I mean, it is not usually the easiest thing to do, so from political stand point is it does play a big role positive and negative because if you want something to be done in an area you go and find the political director there and he/she will help to get it done but at the same time if you need to disrupt, quote and unquote, the activities in the area for the greater good, it is not something that you can easily get done, so politics does play a significant role*" (SII9)

In terms of the legal framework: *"We have a watershed protections Act but that is from 1963 and it requires additions to the legal framework, its regulations, for proper enforcement"* (SII10).

7.5.5 Benefits

The implementers felt that engaging in the process not only improved water safety but was also beneficial in several ways including:

- Better awareness of the roles and activities of different organizations directly or indirectly involved in water provision: "*What this process does is allow us to understand better what each agency is doing and allows us to support each other a bit better where we can in achieving the goal"* (SII2).
- Highlighted the issues and brought clarity: *"We thought it was a good process and it helped us in defining what the issues were, the aspects, the process itself supported a fairly comprehensive assessment. We benefited greatly and I must put on the record that the partnership was great, the CDC, PAHO, USEPA, it was great partnership"* (SII8).
- Acquisition of new skills and equipment: *"... got new equipment and supplies, learnt how to use new technology... It has also helped us to learn and to develop the importance of record keeping, in other words technical measurements, scientific, not only the organoleptic, not only the site seeing and smelling but the other parameters, broadening the parameters, ... the various aspects, the physical, chemical and biological hazards"* (SII8).
- Improved communication and co-ordination of activities between different organizations: *"It's obviously, certainly not new, we have much of the aspects of it already in place what it will add is better communication and perhaps better co-ordination of our activities so with that on agreement we moved ahead with WSP"* (SII2).
- Development of camaraderie and positive feelings among organizations working together: *"It also taught us a big lesson in Jamaica that a multi-agency, inter-agency collaboration, coordination, can work. We developed espirit de corps, if you may, we developed a brotherhood among the various agencies"* (SII8).

- Better image for the country and the water utility, gaining a high profile: *"I must tell you that we have also benefited technically in that we have gone to water safety forums at various locations, to go and share, present, the process, because Jamaica's process was seen as a model, the modality that was used, how we were able to involve the partners and work with the various agencies and so on and basically we were all at one that was something that was beneficial to the country"* (SII8)
- Enhanced engagement with communities in the catchment area: *"... it enabled us to reach out further to the communities in watershed areas that would affect our water quality* (SII2). "*I know that because of the water safety plan there have been improvements in aspects of catchment awareness among the provider in that pilot if nowhere else in the country*"(SII8).

7.5.6 Looking Ahead

Various suggestions were made towards enhancing the success of WSP implementations including:

- Winning the support of senior management: *"... senior directors, senior professionals in the government, need to find a way to communicate the massage up high within the government to affect the decision that will then translate into action"* (SII9).
- Engaging a person with the right technical and communication skills to promote the process and win support*: "You need an effective communicator, a technical person who can communicate to an audience that is not technical, you need a communicator who can highlight how critical it is to manage your watershed, resolve the problems that the plan identified, highlight the critical issues that the plan identified, identify the risks and explain the risks in a clear way and make it known at the appropriate level that this is urgent and if we don't do this, these will be the consequences, putting it in a form that speaks to money and costs what it will cost if we don't do this, if we continue this way what it will cost us and make it real and technically sound, present the case effectively at the*

appropriate level within each of the government ministries so that message is clear..." (SII9)

- Internalization of WSPs among the different stakeholders: *"Implementing a water safety plan is not a task that you just get it done it is basically has to be incorporated into the formal operations of each player through their management structure, through their organisational structure, through their individual budgeting systems, through their community outreach programmes it has to be formally our job descriptions.."* (SII9).
- Follow up on recommendations to each stakeholder to ensure implementation: *"each key organisation would have to be brought in through the management to say all right the water safety plan recommends that this agency needs to do more in this or needs to stick on an additional function and the management has to agree to that in order for it to happen in order for the plan to be implemented basically"* (SII9).
- More activities in the catchment area: *"We did water safety plan but we did not do enough on the watershed, the catchment, which is more crucial area of that, ummh, we haven't worked that area quite well, we need to develop the partnership with the water commission and get into the watershed, the reservoir, the pipes and the treatment is fine but this watershed which is crucial we haven't done so am going to be looking at that support"* (SII8).
- Having incentives in place to reward good performance: *"The reality though is that the government doesn't have a tradition of creating incentives for better performance ... if you want to set standards and you want to encourage people to achieve those standards you must set up a framework that encourages and rewards those who perform and does not reward those that do not perform.* (SII9).

7.6 Inside NWC

7.6.1 Organization's Priority

Employees considered provision of safe water to the customers and increasing service provision as the main priority of NWC. For example, "*Well, there is a change in*

government, there is change in focus in meeting the millennium government goals in terms of trying to get more water to more people throughout the whole country whether it will be metropolitan or bring the focus to try and improve the water production and quality to a large number of people" (SII2).

7.6.2 Significant Changes

Focus on improving service provision was considered to be the main change that had taken place in the organization since the beginning of the reform process. Dissatisfaction with the organization's services towards the end of the 1990s led to civil unrest. As a result of widespread water problems, in 1998 the Government of Jamaica initiated a water sector reform process. Examples of efforts to improve customer service and investments in infrastructure were given in support of these changes.

7.6.3 Internal Relations

The internal relations in Spanish Town seemed relaxed and semi-formal. The conversations between managers and their staff were also relaxed. The only indication of formality was in the use of titles such as Mr and Ms in addressing seniors.

Explaining how disagreements were resolved, it was indicated by most that issues were discussed and resolved through debates, for example, *"We basically sit down and haggle over issues until its sorted out"* (SII10). There was an indication that individuals were open to make their arguments and present different views and the opportunity was there. For example, *" ... from day one the conflicts were put on table on a number of forums, seminars and group meetings the conflict and concerns were raised and worked out, so we were all on the same page, so all the stakeholders were given the opportunity to raise concerns"* (SII2).

Elaborating on how these discussions took place, it was mentioned: *"We argued intensely, the chairperson controlled the discussion well I think, we adapted always a scientific logical frame work in terms of how we argued points, we always kept in mind what we were trying to achieve and I think we set the tone for arguing and for discussion in terms of we want to hear everybody's ideas, we want to hear the roots of everybody's ideas, why they think what they think, so that we properly understand where*

each person is coming from. So it was not a matter of I am right you are wrong, it was let us hear what you are saying because we don't want to miss any aspect or any issue that could come up, let us hear every detail, every perspective and let us discuss them and if there is disagreement let us understand each person's perspective well so that we can appreciate both or all of the perspectives and together decide how we compromise" (SII9).

7.6.4 Working for NWC

Employees considered their work to be challenging but at the same time satisfying. For example, "*It has been a joy, it has been fun, challenging and it has been interesting being a manager ... it's fulfilling to see that the work me and my staff are doing is keeping the people healthy*" (SII2). Most of the challenges mentioned by employees are listed below in Section 7.7.

7.6.5 Risk Management

Nearly half of the interviews were comfortable in discussing risk management, these individuals had been involved in the WSP pilot. The others either deflected the question, or gave general answers, or pointed out that risk management was not in their docket. There was an indication of improvement in risk management since the implementation of the WSP. In explaining the risk management processes that were in place the WSP was described in detail.

7.6.6 Organization's Future

Employees were generally optimistic as to the future of the organization. They felt that they would be improving their service provision, for example: "*I see us providing more water, satisfying all our customers, we are just starting a huge project where by 2013 all persons in Kingston will have water in their taps at all times of the day. So, I see us expanding our outputs and production and improving the quality of water provision and also improving waste water and sewage treatment to the people of the country"*(SII2). Nonetheless, accompanying the optimism were words of caution in relation to the role of the government and the position the government would be taking in terms of its

policies. For example, "*Since this organization is government owned, the future largely depends on the policies and directions that the government wants to take"* (SII4).

7.6.7 External Relations

In describing the community being served, employees pointed out that the area was affected by several social issues that made their work difficult. It was indicated that high levels of unemployment and crime hampered service delivery because some of the customers could not pay their water bills and the areas with high crime rates could not be accessed to undertake activities such as metering.

Employees indicated that the organization was taking various steps to improve customer satisfaction. These activities included improvements in servicer delivery, and better customer service and engagement. 80% of the customers indicated overall satisfaction with the service they received. Some customers pointed out that previously they had many problems with the NWC including poor response to complaints and poor service, however, they pointed out that both had drastically improved and hence their satisfaction.

The most preferred method of receiving information from NWC by the customers was radio and newspapers. The customers explained that being kept informed beforehand of any changes such as service availability would give them the time to be better prepared to deal with the situation. Some customers indicated public relation meetings held by the local government were also good venues for addressing their concerns.

In terms of customer engagement, employees felt that the local politicians and the Parish level leaders could play a better role in smoothing the areas of difficulties between NWC and the customers. For example, "*The other big thing that we do is we work towards community relations and public relations, we try and go to have public relations meetings so we will ask like the parish council or social development commission that when they have a meeting they invite us to go and speak to the people of these communities to try and encourage them to become part of the local system* (SII2). It was explained that politicians could better facilitate activities such as dealing

with access for metering purposes, commercial activities causing pollution, and unplanned settlements.

Describing the relationship with WSP promoters, employees indicated they had a good working relationship. For example, *"It is very good, understanding, respecting overall shortfalls and also accepting overall strong points. I think we have a very good relationship and we work quite well together" (*SII2). In terms of improving this relationship, it was mentioned that there was a feeling that there was a bias towards the Spanish speaking countries. One of the employees pointed out: "*I want for the English speaking Caribbean to have a more stronger defined focal point I represented the English speaking Caribbean with some other colleagues in Honduras and in Chile and I am in one of the sub committees, they also thought things are a bit more biased to the Spanish speaking or Latin American countries ... we need more focal point in the English speaking Caribbean, so that we can move things, that can keep countries of the English speaking Caribbean informed on a timely basis."*

7.7 Challenges Facing Organization

NWC faces several challenges in its service provision to the residents of the Kingston Metropolitan Area (KMA) and the neighbouring parishes. Rapid population growth and an aging infrastructure means the organization cannot keep up with service demands. Although Jamaica has a low population growth rate (0.5%) the KMA's population growth rate is four times higher at 2.3% (Grey, 2007). In 2001 the KMA accounted for 24.5% of Jamaica's population. NWC (2008) indicates that "... both water supply and sewerage infrastructure often have to play "catch-up" with service demands" as a result of rapidly changing population growth trends. (NWC, 2008)

One challenge identified by all employees was financial difficulties facing the organization. There was an indication that lack of funding made service provision difficult. Some saw financial difficulties outside of the organization at the customer level also as having an effect. For example, *"The biggest challenge is the ability of our people to access necessary funds to do some of the critical work and job that needs to be done both internal in the company and external in the population of the country in*

general paying for the service and reward the service that we provide to them in terms of the water (SII2). *The nature of our business is that we are an arm of a government ministry, the thing is, we don't get salvation from them in terms of the budget so we have to make our own money. We respond and answer to a minister and a permanent secretary"* (SII3).

Unaccounted for water and illegal connections were considered to be of concern to the organization. For example, it was mentioned "*OK we have a whole department that deals with unaccounted for water; we have another department that deals with uncontrolled settlements so we work with those* (SII2). Non revenue water in St Catherine Parish which includes Spanish Town is estimated at 68% of which 6% is unauthorized consumption (NWC, 2011). High levels of NRW have impacted on the NWC's financial and operational capabilities. NWC's attempts at increasing water tariffs have been met with stiff resistance. Consumers have raised issues such as frequent lock-offs, leaking mains, and poor water quality in support of their resistance.

The NWC indicates its infrastructure is well known to be aged and in some cases below the desired standard. Urgent need for improvements and upgrades is acknowledged and there are several ongoing infrastructure overhaul projects such as the KMA Water Supply Project. According to Smith (2011) "Poorly maintained and limited equipment, outdated technology, and a shortage of technical staff are some of the challenges being faced by the National Water Commission (NWC) in the execution of its duties." NWC attributes its infrastructure problems to financial challenges worsened by acts of vandalism, tampering, theft, and increased costs associated with treating excessively polluted water sources.

Pollution of underground and surface water is of significant concern to the NWC. In addition to posing health risks, poor water quality at source means high treatment costs for the NWC. Pollution in this area is caused by domestic, commercial and industrial activities. For example, some areas in the watershed have been severely degraded as a result of bauxite mining (EEM, 2007). Table 7-1 shows the main sources of contamination of the Rio Cobre. The irrigation canal is affected by improper solid

waste disposal, sewage effluent from informal settlements along the canal, and waste water from informal activities such as car wash.

Although the effluent quality from the contamination sources are monitored by NEPA many of these establishments do not have licences for effluent discharge apparently because they existed before the effective date of licensing regulations.

Table 7-1: Contamination Sources in Rio Cobre (EEM, 2007)

Contamination	Source Examples
Agro-industrial and industrial effluent	Nestle discharges untreated effluent into the Moona Spring which flows into the Rio Cobre
	Jamaica Citrus Growers Ltd discharges untreated waste water directly into the Rio Cobre
	Accidental caustic effluent spills from bauxite alumina company at Ewarton eventually reach the river increasing the pH and sodium content
Sewage effluent	Direct or indirect (via gullies and tributaries) effluent discharge by 10 sewage treatment plants within the upper watershed. Only three of these plants have licences for effluent discharge from NEPA.
Agricultural runoff	Chemicals from pesticides contained agricultural runoff and turbidity from storm water, agricultural runoff and sand mining.
Solid Waste	Disposal of solid waste in gullies, tributaries and the river

The issue of contamination is made more pressing by the hydrology of this area. Any contamination within the Rio Cobre basin of ground or surface water exits the basin via the Rio Cobre (Smith, 2011). NWC indicates that "Water is often taken for granted. For many people, water comes from a tap and is viewed as an ever abundant and renewable resource. However, water resources are finite and are threatened by poor land management, and improper agricultural and industrial practices." (NWC, 2009)

The enforcement of law was considered to challenging, for example it was explained that: *"The location that we chose had some peculiar difficulties because of our social*

and political realities here in Jamaica. Everything is not in the control of government regulating agencies, there are some decision that are not in our power to make and so we recognise it will not be simple to just go ahead and make things happen; people are living in places that they should not live, people are operating businesses in places where they should not be and some of us did not have the power to move them and so that remains a challenge for us" (SPI2, 2010).

It was also pointed out that more inter organizational collaboration would be desirable for example, when it comes to approving new housing it is the Parish Council that is responsible, it was felt that taking aspects such as water needs and environmental concerns into considerations prior to approval in consultation with other relevant bodies would be more appropriate.

94% of the customers and 84% of the implementers considered corruption to be rife in Jamaica. During a customer interview in Spanish Town, a local resident angrily expressed himself in patois "*Wi tiad a di corruption!*" (SCI5, 2010) meaning "We are tired of corruption". This statement not only captured the extent of the problem but also indicated the underlying emotions. The number of customers and implementers who thought corruption negatively impacted on water services was also high at 90% for both. Most of the examples given of corruption involved petty corruption involving frontline staff. For example, *"Some of them ask for some cash and they solve your problems"* (SCI7, 2010).

Several issues concerning the management of knowledge were raised by staff at the utility and other members of the WSP team. Examples of issues raised include:

- Inconsistency of representation at meetings and not having the right representative: *"...they sent their representatives although representation changes affected the flow of information within the chamber because it should have been at the highest level ... but they kept sending representatives who really didn't understand the direction even though the terms of references were drafted..."* (SPI4, 2010)

- Loss of information or lack of awareness of its existence or where to find it: *"I have seen it happen time and again where the information gets lost,... mind you fragments of information could reside within an agency you know, however, that document ought to be able to direct you to where you need to go to find additional information if you need it... Let me give you an example, (name deleted) might have information that I would like to have but I just don't know that it exists, if we are not in the same room having the discussion, I could go and think that information does not exist and its right there somewhere for me to go and pick it up. This document that you spoke about earlier I had no idea it exists until today; now that I know, I am going to try and get a copy and read it.* (SPI3, 2010).
- Lack of adequate funding for monitoring water quality: "*Where we are currently falling short especially, is where water quality management is concerned we have been focused more on water quantity management, so we know how much water is where, how much we can take from rivers, how much we can take from wells, for various uses, but our budget for monitoring quality has been cut significantly"* (SII9, 2010).
- Not using available information even when there is awareness of its existence:*"But prior to the development of the national integrated watershed management programme there was a coming together of the scientific minds to bring remote sensing and biophysical information about your catchment area together into a database and various aspects of information or use, your geology, soil or rainfall levels, your land use, land cover, all these were put together into a giant database and you could from there on know where certain types of risks were, so that should inform development ... so this type of work has been done, you know, it's just that sometimes that stuff, various volumes of information that exist, we are not using such information to a full extent".* (SII4, 2010).
- Low levels of community consultation: *"We have a fairly well fleshed out water policy and it is presently being reviewed, the process of reviewing it has been quite, adequately, needs a little bit more wider participations in terms of getting community people involved in the review of the policy..."* (SII9, 2010).

- Lack of processes to ensure knowledge transfer between employees: *Mr* (name removed) *alluded to it earlier when he spoke about the collaboration and it really hit me when he talked about some people resigning and the chain is broken, knowledge management succession planning, that is a real challenge to recognize, it is a significant problem and we will never understand how big that is until we are able to step back and see the whole thing and see that where we think there are gaps there are no gaps, the information gaps are much smaller than we think, what is not available is the connection the connectivity so I have something, you have something but the imperfect information you know I don't know what you have and you don't know what I have."* (SPI2, 2010)
- Reliance on foreign consultants who do not transfer the skills: *"We have a water resources master plan which is required by the law, for us to plan at the national scale, that process is in my opinion weak that whole process of preparing the master plan, we need to develop much more local competence to prepare that plan, we have been relying heavily on overseas consultants and forking out lots of money for them to prepare this master plan for us and while they do it they have not transferred the competence, the know-how to do it... if we are bringing persons from overseas there must be a strong commitment to sharing and having a flow of skills and expertise so that we all learn..."*. (SII9, 2010)
- Inadequate knowledge dissemination upon project completion: *"... sometimes you have a project and the project documents its prepared, it is done and its somewhere but the follow through, so it gets lost, so what we are trying to do here now is to make sure that whenever a project ends its automatically incorporated into the mainstream activities of the agency]"* (SPI3, 2010).

An organizational analysis conducted around 2004 identified several problems and weaknesses that have affected NWC over the preceding two decades. The report identified the following weaknesses:

> "(I) the organizational structure promotes duplication, therefore accountability is weak;
>
> (ii) the demarcation of areas for services is not on the basis of water supply systems in existence;

(iii) the deployment of resources is not always on the basis of identified needs;
(IV) insufficient customer focus; and
(v) inadequate compliance management." (Traverso et al, 2004)

Following analysis and consultation among key stakeholders, the KMA Water Supply Project was developed as a comprehensive project to improve the provision of adequate safe drinking water to the area residents. Activities undertaken in this ongoing project include the rehabilitation of facilities, development of new sources, artificial groundwater recharge, and improvements in organizational capacity. The NWC is undergoing an overhaul through its modernization and reorganizational plan. Measures in this plan are aimed at enhancing the organizational and institutional capacities of the NWC and include aspects such as organizational restructuring and cultural change program.

7.8 Conclusion

In Spanish Town nationality is the main descriptor of culture used by participants. The cultural perceptions and uses of water were mainly secular in nature. Despite only a third indicating theistic explanations in their perceptions and uses of water, two thirds hold the belief that water should not be sold. Even though recent improvements in the water supply have increased customer satisfaction, they all had storage containers and nearly a third of them used supplementary treatment before drinking tap water. Multiple challenges in the sourcing, treatment and distribution of water stand as obstacles towards providing safe water. Issues impacting on WSP implementation range to knowledge management practices within the organization to the non-implementation of laws governing the water sector.

8 DISCUSSION

8.1 Introduction

This chapter discusses the findings of this research in relation to the pertinent literature. First, a brief overview of the operational and institutional environment of water utilities in developing countries is presented. Then culture in the study areas is discussed followed by an assessment of the reception, perception and implementation of WSPs. Following this is a discussion on how cultural factors impact on the implementation of WSPs including an evaluation of constraints to the transfer of WSP Knowledge. Finally, a framework for addressing the impact of culture on the implementation of WSPs is proposed.

8.2 Water Utilities in Developing Countries

Although developing countries share a common name, they do widely vary economically between and within them. However, there are many similarities in the operational and institutional environments of their water utilities which are discussed in this section.

8.2.1 Operational Environment

Poor governance and instability are common in the developing world. In many developing countries the reality that the next morning the government might not be in place is one that limits ambitions and the capacity for development in all sectors including water. Political interference is cited among the factors that hampered NWSC's progress prior to 1998 and the lack of it since then is considered among the reasons for its success (Berg & Muhairwe, 2006). Poor governance and political instability contribute to low expectations.

The dire need for water in most developing cities is evident. In many of these cities it is common to see people moving about with water containers in search for water, or acquiring more containers for water storage. Since there is water rationing in most of

these cities, people want to store as much water as possible for the duration that the taps are running. The findings in this research indicate water utilities in developing countries are in a precarious situation faced with intricate and interrelated challenges that seem insurmountable. On the one hand they are confronted with demand related pressures and on the other with supply connected strain. In addition to this they also face enormous sanitation challenges.

All the three areas studied here have seen rapid population growth. Between 1960's and now Hyderabad's population has grown almost tenfold. Kampala's population has quadrupled since the 1980's. In Jamaica the Kingston Metropolitan Area accounts for 24.5% of the country's population with a growth rate four times higher than the rest of the country. The growth rates in these cases are fuelled by both high birth rates and rural urban migration. The culture of having as many children as possible as an insurance policy, source of income or pride, in many developing countries, fuels high birth rates. This is particularly true in rural areas where young people eventually migrate to cities in search for greener pastures. In some communities it is almost considered a rite of passage to move to a city at a certain stage. Unfortunately, on moving to cities, most of these individuals end up in highly populated low income and underserviced areas. In addition, they bring along what has been termed 'rural cultures' by some interviewees in reference to practices such as open defecation. Population growth further complicates service provision initiatives.

A growing population means an increase in demand which requires infrastructural upgrade in order to be met. Unfortunately, the state of the infrastructure in many developing countries is inadequate. For example, in Hyderabad the HMWSSB is faced with insufficient holding capacity in the reservoirs and a limited distribution system compromised by an aged network. The NWC indicates its infrastructure is well known to be aged and in some cases below the desired standard. Another aspect of poor infrastructure linked to water safety is low sewerage coverage. Hyderabad has sewerage treatment capacity of only 23 % (Ramvat, 2010) resulting in the discharge of untreated sewerage into water bodies and open drains passing through the city. NWSC's sewerage coverage for Kampala is only 5% (NWSC, 2010). The number of those connected to the sewer in Spanish Town is estimated at 16.8%.

Poor infrastructure is a persistent problem in developing countries. While some places require fixing of leaks or changing of pipes and covering of open sewer lines, other areas require access to the network. Besides improving delivery capacity, increasing of processing and supply levels is also required.

Advancement in any sector would be adversely hampered or made almost impossible by such levels of infrastructure development. In the three cases studied here the need for infrastructural development in the water sector is evident especially in the low income areas. Sometimes infrastructural improvement in the poorest parts of a city are overlooked or overstepped on the basis that development in other productive areas would yield more benefits. However, such arguments "...underestimate the overall social welfare from investing in service supply especially among the poorest residents in developing country cities" (Anselin et al. 2008). Another obstacle to infrastructural development in low income areas is the diversion of resources to other areas more likely to have lower population densities. Such diversions mainly take place as a result of high flexibility levels driven by either political influence or corruption.

Having sound and functional infrastructure is crucial towards water safety. In spite the status of the infrastructure in these cases, their conditions are much better than many other cities of comparable status. These cases, whether through donor assistance or government support, have been blessed by the capacity to invest in some infrastructural development. However, it remains that "In almost all of the developing world, the rate of water supply and investment falls behind urban growth" (Priscoli et al, 2004).

All three utilities relate their infrastructural problems to lack of financial resources. The findings indicate that this challenge, as shown in Figure 8-1, is tied to low income and high expenses and linked to several other underlying factors such as low funding levels from governments and donors. Some of these factors such as population growth have been discussed above; the rest will be dealt with later in this chapter.

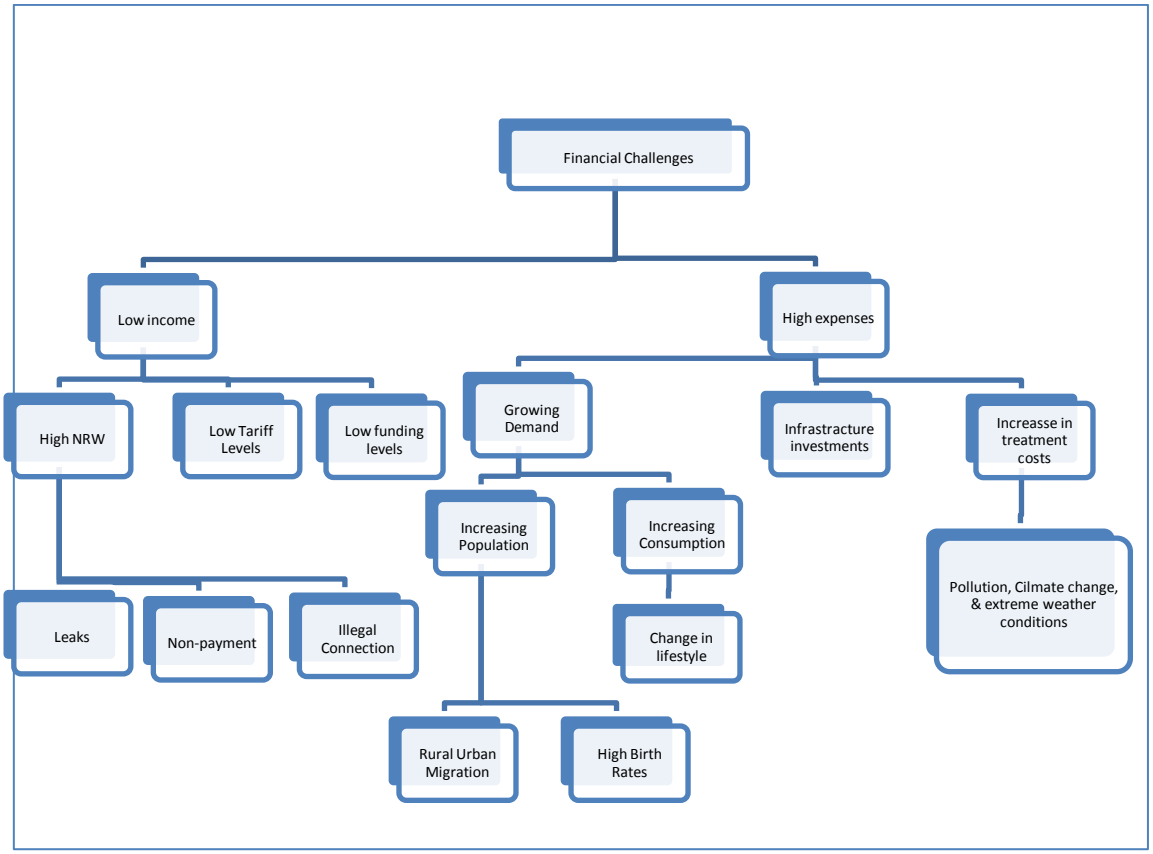

Figure 8-1: Financial Scarcity and Related Challenges

The three utilities have high levels of non-revenue water: 38% for Hyderabad (ASCI, 2009), 42.9% for Kampala and 68% for St Catherine Parish (NWC, 2011). Contributing to these high numbers are leaks, illegal connections and non-payment. High levels of leaks not only contribute to water loses but have also been used to challenge attempts at increasing tariff levels as seen in Hyderabad and Spanish Town cases. In some instances where it is possible for utilities to increase supply levels their attempts are thwarted by lack of source control. For example, in Hyderabad the Irrigation Department is in charge of the Nagarjunasagar on the Krishna River, and Singur on the Manjira River and it has stiffly opposed the utility's attempt to gain control over Singur. In Spanish Town the water canal is managed by the National Irrigation Commission from which the utility requires permission to abstract water.

The utilities cannot gain control of these sources because of competing demands upstream. The ever more prevalent scarcity of water presents a hazard that can be

tackled by addressing the cultural aspects associated with it. Even though water scarcity can also be linked to global climate change, many of its aspects have a connection to culture. In the spirit of WSPs, the issue of water scarcity can be dealt with by addressing associated cultural practices from the catchment to the tap. Deforestation in catchment areas, irrigation customs, storage traditions, and consumption methods are all part of cultural practices contributing to water scarcity. While water scarcity is becoming an issue of concern for most parts of the world, the impacts are more detrimental in developing countries. The importance of dealing with water scarcity is elevated by how it negatively impacts on efforts to supply safe water. As one manager put it, "When there is no water, quality becomes a secondary issue" (KII3).

8.2.2 Institutional Environment

Organizations that are engaged in the provision of water services, to use an institutionalist term, operate in a field. As described by Powell (1983) an organizational field is a recognized area of institutional life comprising of different actors. The actors in the organizational field of water utilities in developing countries include customers, local communities, other water utilities, the state, donors, and development partners.

It is from the actors that organizations gain legitimacy and support. As such, institutional environment is "characterized by the elaboration of rules and requirements to which individual organizations must conform if they are to receive support and legitimacy…" (Scott and Meyer, 1983). The rules and requirements to which water utilities must conform in order to receive support and legitimacy from the different actors are often not aligned. A good example of this can be seen in the requirement to attain cost recovery by actors such as the World Bank and yet efforts aimed at achieving this, such as tariff increases, are obstructed by politicians. Clearly as pointed out by Scott (2004) "... institutional environments are not monolithic, but often varied and conflicted."

Organizations in a field tend to copy each other through the process of isomorphism. The reform processes that were carried out in the three water utilities studied here provide an example of this concept. Through the influence of the World Bank, an important actor, reforms that imposed new organizational structures and forms that

resembled each other were carried out across these organizational populations. By adopting these reforms, the water utilities gained legitimacy and support from the actor. Currently ongoing reforms such as emphasis on customer service and also the implementation of WSPs can be viewed in similar manner.

This brings us to the process of institutionalization. WSP is a risk management approach created in developed countries and being promoted in developing countries. Actors such IWA and WHO are actively involved in the process of institutionalizing WSPs in both developed and developing countries. The process of institutionalizing WSPs can be described through three mechanisms described by Scott (2008), which are institutionalization based on increasing returns, based on increasing commitments, and institutionalization as increasing objectification.

Institutionalization based on increasing returns relates to "... the development and persistence of institutional systems based on the process of positive feedback" (Scott, 2008). Water utilities are being given incentives and shown that, for example, WSPs can be used to augment funds for improving their infrastructure. The driving force of the argument for this mechanism is bringing to the fore the role of incentives as a motivating force (Scott, 2008). Water utilities are being shown it is costlier not to have a WSP and that the benefits of a WSP are far more superior.

Institutionalization based on increasing commitments focuses on the mechanisms of commitments where "Possible loci of commitment include norms and values, structures and procedures, and individuals and collective actors" (Scott, 2008). Activities carried out by WSP promoters such as signing of commitment letters by implementers and stakeholders fall into this category. Here institutionalization is seen as described by Selznick where "in its most significant meaning, 'to institutionalize' is to *infuse with value* beyond the technical requirement of the task at hand." (Scott, 2008)

Institutionalization as increasing objectification is concerned with the processes through which ideas become independent entities. Scholars favouring the cultural-cognitive pillar of institutions build on the work of Berger and Luckmann to "... emphasize the role of increasing objectification of shared beliefs in institutionalization" (Scott, 2008). The diffusion of WSPs by promoters as a best practice in managing drinking water risks

can be viewed as such. Efforts in this area can be seen through promotion of research such as this which addresses the influence of culture on the adoption of WSPs.

8.3 Overview of Culture in Study Areas

In this section I discuss culture at the local and organizational levels. As established in Chapter 2.4.1, I consider culture to be the learned dynamic patterns of social behaviour and attitudes based on underlying values and beliefs used by a group of people as a guide to interaction among themselves, with others, and with the world around them. This new definition is descriptive of culture at its different levels.

When it comes to culture, there are many differences between and within developing countries as seen in the studied cases. Despite the differences within and between these cases, they all share a common legacy in the form of British colonization which has imbued several cultural aspects, such as language, governance, and legal systems. It is within this context that I ventured to look at the impact of culture on the implementation of risk management tools in the water sector of developing countries.

8.3.1 Local Cultures

The findings shown in Table 8-1 indicate that culture is variedly conceived in each of the study locations. Nationality, religion and locality were the main ideations of culture in the study areas. When asked if there was any other way they would describe their cultures, participants either gave a different answer which also made similar references or repeated the first response. These ideations are the sources of basic assumptions and values which lie at the core of Spencer-Oatey's (2000) onion ring model. The basic assumptions and values produced by these ideations shape the subsequent layers of culture consisting of aspects such as beliefs, attitudes and conventions, institutions and systems, and rituals and behaviour.

The description of their cultures in more than one way by the participants can be taken to indicate subscription to more than one source of values. As shown in Table 8-1, in the three cases, the picture is more complex in Hyderabad where significant numbers of the participants used the different descriptors. Ethnicity was the main descriptor of

culture in Kampala where 98% and 86% of the customers used it as their first and second descriptor respectively.

Table 8-1: Customer Description of Culture

Description	Hyderabad (n=50)		Kampala (n=50)		Spanish Town (n=50)	
	First	Second	First	Second	First	Second
Ethnicity	56%	44%	98%	86%	nil	nil
Nationality	30%	26%	nil	nil	94%	80%
Religion	14%	24%	2%	4%	6%	4%
Locality	nil	6%	nil	10%	nil	16%

In Hyderabad, Ethnicity was also the main descriptor in the first and the second instance at 56% and 44% respectively. In contrast to Kampala and Hyderabad, none of the participants in Spanish Town used ethnicity as a descriptor of their culture. However, some of them described the ethnic origins of their fore parents and used it as a definition of their individual identity. Relating this to Bartle's (2007) political dimension of culture, the scale of use of ethnicity as a cultural descriptor can be indicative of a tribal status more so in Kampala and Hyderabad than in Spanish Town. Participants in Spanish Town have lost the ethnic element of cultural identity as a result of their ancestors being plucked away from their ancestral homes or as a result of migration. It was interesting to note that this vacuum, in practice, has been substituted by membership in political parties. On a drive to Kingston from Spanish Town, I passed by a community in which members of the country's two main political parties lived on either side of the main road. I could not help but draw comparisons with towns in places like Somalia where people live in either side of the road according to their clan membership. The use of nationality as the main descriptor of their culture by participants in Spanish Town (94% and 80% in the first and second instance) can be indicative of change in Bartle's (2007) political dimension of culture showing a movement from the simple tribal status to the more complex aspect of state.

In terms of implications for the implementation of WSPs, these finding means individuals hold more than one source of values and these have to be taken into account. There are cases where adherence to one source might be overpowered by another and other cases where the values from one source might be in conflict with another as will be noted later in this discussion.

Developing countries tend to have an orientation towards the past or the present time. In all three cases, there was a lot of caution when speaking of the future. For example staff at the utility would use qualifying nouns when giving their views of the future. Not being future oriented "... results in a more short-term orientation to activities" (Jaeger, 1990). This is in conflict with the preventative and future oriented nature of WSPs. Developing countries have a polychronic vision of time where "time is experienced as unlimited and simultaneous" (Dahl, 2004). In such cultures interpersonal relations tend to be more important than time and many tasks are handled simultaneously. For international WSP development partners, especially from developed countries, being aware that meetings will start later than planned and time will not be kept to will reduce the chances of being stressed or burnt out.

Many cultures in developing countries adhere to old traditions of social groupings and stratifications, ranging from the tribes of Africa to the castes of Asia. These types of organizations can have both positive and negative effects, but unfortunately in today's modern world the negative effects outweigh the positive. Governments and other forms of organizations have taken up most of the social responsibilities carried out by these groups leaving them to mostly engage in mischief ranging from discrimination to ethnic cleansing. Ethnic and tribal wars in many developing countries have disrupted social order and created lawlessness. For countries which are engaged in such conflicts the effect on the attainment of water and sanitation provision goals is obvious. As for countries which have come out of such wars and managed to progress, the psychological impacts are still being felt. For instance in Uganda even after more than a decade of stability, utility managers were cautious in speaking about the future and used caveats such as "if things remain the same, you know this is Africa" (KII3, 2009).

In many developing countries when it comes to accessing water services, belonging to a particular group presents an advantage or disadvantage depending on the group. For example, in India coming from the lower castes means being highly presented among those who lack access to services while in many parts of Africa belonging to the president's tribe means expeditious water connections. These groupings are also a major drive for corruption. Social responsibility to support members of one's own group would more than often translate into abuse of office or power. For instance it should not be a surprise to see a politician fighting for the inclusion of a member of his community into a WSP steering committee. The zeal of the fight will of course depend on the expected levels of remuneration.

In all three cases it was not uncommon to see signs of open defecation. The acceptability of both open defecation and public urination varies from culture to culture. In addition to lack of toilet facilities open defecation is also highly influenced by cultural factors. In some communities, the toilet is associated with demons and people would rather use open defecation than risk being possessed. In places like India where toilet cleaning is designated to a certain caste, people would rather open defecate than clean a toilet to use it. Even in countries where open defecation is totally unacceptable, the practice of urinating in public, especially by men, is not frowned upon as such. In most rural areas of the developing world open defecation is part of the norm and in some cases it is preferred over the use of toilets. In urban areas the problem mostly occurs in slums and low income areas of cities. Open defecation can have deadly consequences when water contamination risks are considered.

Housing construction methods and the sizes of lanes between plots are a reflection of a community's culture. Narrow lanes between plots complicate the laying of water pipes as seen in Hyderabad. Even though the narrow lanes of Hyderabad's old city are from many years past, it would not be a waste to have guidance on distance between plots to allow efficient placement of pipes especially for cities that are new or expanding. In many developing countries people are grabbing land set aside for road reserves or network expansions. These types of practices can be linked to corruption and are contrary to the futuristic and forward looking nature of WSPs.

8.3.2 Organizational Culture

The three water utilities studied here have various similarities and differences between and within their cultures. Johnson's (1992) cultural web covering the intrelated elements of power structures, organizational structures, control systems, stories and myths, symbols, rituals and routines is used here in providing an overview of the organizational cultutre at the three utilities.

- **Power Structure**

The power bases at the three utilities are the boards that oversee them. However, the ultimate power lies with the political masters who appoint these boards. Where in Hyderabad the board is appointed by the state government, in Uganda and Jamaica the boards are appointed by the national governments since the utilities operate nationwide. This ultimate power is mainly seen in the control yielded over their budgets, the setting of tariffs and the making of politically sensitive decisions such as eviction of land squatters. In Spanish Town the WSP pilot had to be delayed because of a change in government. In addition, in these cases some felt that there was a connection between ethnic and political affiliations in some of the board and top level appointments.

Operationally, the top leadership at these utilities have the greatest amount of influence. The powers yielded by NWSC's top leadership were more compared to his counterparts at the two other utilities. Departmentally, the water quality control teams at the three utilities felt they had less influence in the organization compared to their colleagues in the engineering departments. Given this influence some felt that more emphasis was being put on meeting quantity needs and quality issues were not being given the deserved attention.

- **Organisational Structures**

All the three utilities studied here are publicly owned and have deep hierarchical structures. The management levels in these organizations are six at HMWSSB and four each at NWSC and NWC. The organizational structure in Uganda has more management functions compared to the other two utilities and includes functions such as institutional development and management services. The organizational structures

reflect the power structures with most powers at the higher level. As a result of reforms that have taken place, some powers have been delegated to managers at the lower levels. Devolution in Hyderabad is seen in the functional interactional levels of circle, division, subdivision, and section where managers at these levels have become more empowered. In Uganda devolution is reflected in its set up of branches while in Jamaica it is seen in the set up of its two divisions and four management areas.

- **Control Systems**

The control systems in all the three organizations including financial systems, quality systems and rewards are developed to varying degrees. In Hyderabad and Kampala emphasis on customer services has resulted in better systems designed to address customer complaints and the reward systems have been linked to these. The performance management contracts adopted in Uganda have been effective in improving service and are being emulated by different utilities around the world. The impact of incentives on both organisations and individuals was noticed at NWSC. The incentives employed by the company ranged from delegation of responsibilities, financial bonuses and recognition for meeting goals. Recognition and motivation can have far reaching impact on human performance and can produce remarkable results especially when behaviour change is intended. Whether it was the trophies seen in managers' offices or the ISO certificate seen in the main office, the environment looked competitive and a desire to win was expressed; this was not sensed in Hyderabad and Spanish Town.

At the same time, a desire to have different standards and performance levels for developing countries was noted in both Hyderabad and Kampala. Some interviewees felt that their city should not be held to the same standards as cities in developed countries. These standards varied from human rights to water standards. When pressed for an explanation as to why standards had to be different, the answers were mostly the same, as one interviewee put it "It is not the same here, like in those developed countries" (KII8).

A culture of low expectations and an attitude of 'this is the way things are here' will present an obstacle to the sustainable implementation of WSPs. Accepting the way

things are means accepting the current service levels and the associated failures. Some commentators on the problems facing developing countries consider them to be insurmountable. This pessimistic view does not enhance chances for improvement and can be linked to fatalistic beliefs.

Overall, the control systems in place are mostly weak and reactive. These systems, particularly asset, quality, and financial control are playing catch-up with employees and customers who seem to be ever creative in bypassing them. Examples of such activities range from customers bypassing meters to managers depositing large sums of money acquired through corruption into friends' bank accounts in order to avoid detection.

- **Stories and Myths**

The stories and myths told in these organizations portray a recurrent theme of struggling martyrs and frontline soldiers. The story lines are similar indicating how staff have to cope with meagre resources, political pressure, and lack of customer cooperation in their efforts to quench the thirst of their customers. Another common theme in the story lines in Hyderabad and Uganda was change. In both cases employees talked about how their organizations had changed and how the employees have become more empowered. Unlike Hyderabad and Jamaica where there was no one main character, the stories told in Uganda had the director at the centre stage and as the main character.

Outside of the organizations the stories told evolved around service delivery and change. In all three cases the customers narrated that the organizations had improved in service delivery pointing to improvements in water quality, rationing, connections and addressing of complaints. However, it was interesting to note how customers in the three cases differently described the element of trust. In Hyderabad majority of the customers indicated they trusted the water but not the utility. In Kampala majority of the customers mentioned trusting the utility but not the water while in Spanish Town most of the customers indicated they did not trust the water or the utility.

The goal of the Bonn Charter is "Good safe drinking water that has the trust of consumers" (IWA, 2004). The findings show three different levels of trust: first,

consumers' trust of the utility that serves them. Secondly the utility's trust of the consumers that it is serving and thirdly, the consumers' trust of the water they are being served. In Hyderabad, during the first few interviews, I was met with tension and even a request to terminate an interview on asking the customers what the word "trust" meant to them. On asking two different informants what the word trust meant in Hindi they said *bharōsā* and indicated that this also meant faith. Thus it emerged that in the local languages the word trust and faith meant the same thing. An online English-Hindu dictionary also has both the words trust and faith defined as *bharōsā* among many other meanings. The interviewees were probably tensing up because here was a foreigner asking them about their faith. The link between the word trust and faith might explain why majority of the customers in Hyderabad indicated trusting the water given the theistic linked perceptions of water in their culture. In Kampala majority of the customers indicated trusting their water supplier, but not the water indicating they regularly boiled their drinking water because of fear of illness. NWSC though being confident of its water quality, could not bring itself to tell its customers to stop boiling their drinking water. Their argument was that many things could happen to the water between their facilities and the taps. Nonetheless, it seems NWSC did put a lot of effort to have the company become trusted as an organization. The following excerpt from a document by the company shows how:

"NWSC dealt harshly with staff and managers who violated principles of honesty and trust. The MD was particularly in the spotlight in this regard—both as a cheerleader for the organization and as a person who set the tone for others. However, the capacity to detect malpractice depended on effective use of both formal and informal monitoring techniques" (Berg and Muhairwe, 2006).

The lack of trust indicated by customers in Spanish Town can be indicative of the general attitude towards trust in Jamaica where it was common in casual conversations to be told "Don't trust nobody" or hear people say "Me don't trust nobody". In all three cases the implementers indicated low levels of trust towards the customers particularly those in low income areas. They attributed this to non-payment of bills or tampering of their pipes by the customers.

This finding shows that trust towards the water is not necessarily linked to trust towards the service provider, the two can be independent. It also shows that the trust of water

can be influenced by the cultural perceptions of water and that the word is held in high esteem and has the same meaning as faith. In addition to showing trust as being used to emphasise its reciprocity between customers and service providers, the finding also shows that the element of trust can be influenced by the general attitude towards it. Finally, trust is an indication of reputation and as pointed out by Bartram et al (2009) elements that pose a significant risk to a utility's reputation should be addressed for WSPs.

- **Symbols**

In all three utilities there were strong visual representations of the organizations. The utilities logos are well displayed and easily recognised by the customers. In all three utilities the colour of choice is blue and promotion material including websites display different assets. The offices are plush compared to other local service providers and portray established institutions. The language of customer service has been adopted in all three utilities and emphasis on customer service is portrayed in the office set up. In Kampala it was interesting to note marketing language being used by staff. For example, giving advice to other managers a branch manager indicated "*Packaging your product well in line with customer demand, will ensure that you succeed*" (KII). This marketing approach could be reflective of the MD's background and approach.

In all three utilities managers are formally addressed using local titles indicating respect as in Hyderabad, or formal titles indicating qualifications or position as in Kampala, or simply addressed as Mr or Ms as in Jamaica. Power is symbolised through amenities available to managers such as vehicles, office location, secretaries as support providers, and reserved parking.

- **Rituals and Routines**

The rituals and routines in all the three cases evolved around problem solving. In all three utilities managers indicated their daily activities were mostly shaped by what was happening. Blame targeted at the customers, the government, or other departments was common. The established paths to joining the organization and advancing in it somewhat differed. In Hyderabad, the managers mostly have engineering backgrounds and the order is to do your time and work yourself up. In Uganda, managers came from

different backgrounds and advancement in the organization was clearly pegged to performance. The MD in Uganda, himself with non-engineering background, made it possible for non-engineers to bid for branch management jobs. In Jamaica, it was in between Hyderabad and Uganda, there was possibility of joining the organization from outside based on experience.

There were symptoms of lethargy and frustration among some of the staff in Hyderabad, for instance, when asked what lesson he had learnt during his more than 20 years at the organization, one manager indicated "*Nothing special, just doing whatever assignment is there*" (HII3).

8.3.3 Change and Resistance to Change

Many developing countries have conservative cultures. This trait is also reflected in their institutions and organisations. At the same time it would be hard to ignore the impact of globalization on national cultures across the world. As shown in Table 8-2 majority of the customers in the three study areas acknowledged the concept of cultural change. First responses given by participants on how their cultures had changed over the years included no change, change in values, technological change, and urbanization.

Table 8-2: Customer Views on Cultural Change

Description	Hyderabad (n=50)	Kampala (n=50)	Spanish Town (n=50)
No Change	38%	24%	22%
Change in Values	8%	2%	6%
Technological Change	52%	70%	60%
Urbanization	2%	4%	12%

The area of change described by a majority in all three locations is technological change. Comments regarding this aspect of change made references to readily visible artefacts or processes. Examples of these comments include: "*Our culture has changed. Just look at how we communicate, before we used drums, now we have cell phones and email*" (KCI10). "*We have advanced technologically. India was renowned for spices and today we are leading in IT and manufacturing*" (HCI28).

At the national level the changes that are taking place can be seen in the symbols, attitudes, and values. In places like Hyderabad the high-tech block is a new symbol of development and progression. However, it is also important to point out that there is resistance to change. Most of this resistance can be felt when nostalgic references are made to a past which was perhaps non-existent. A recognition which is of high importance to risk management in the water sector is that the WSP mechanism is a process that involves change and not an end in itself.

Using Bartle's (2007) technological, economic, political, institutional (social), aesthetic-value, and belief-conceptual dimensions of cultural change it can be pointed out that cultures in developing countries are changing across all six dimensions. I think the issue is not whether change is taking place but rather how the change is taking place. For one, in many developing countries the disparities between end points along these change dimensions are wide. Secondly, the disparities between developed and developing countries along these dimensions are also wide. To use an analogy, if we consider the status of being a developed country as the destination, developing countries can be viewed as passengers on transit. A customer commenting on change in values felt that they had abandoned their values for new values which they have not mastered yet. He explained:

We have a story on how the fox came to walk the way it does. It had a normal walk but was always impressed with the majestic walk of the lion and it wanted to imitate this majestic movement. In its attempt it left its own walking style, but sadly it never attained the lion's. And as such the fox has ended up with an awkward style. We have left our culture imitating foreign cultures and now we are in the same predicament as the fox. YO: in what ways have you left your culture? Oh in many ways, people are driven by self interest and greed, there is no sense of community, there is no shame, there is no respect and everybody is busy in his own world.

In spite of the above, looking at current global trends such as the Arab Spring it can be argued that globalization manifests openness, democracy and accountability. The trickledown effects of such changes are also impacting on organisational cultures. As globalization values are adopted by the younger generations other values such as efficiency and accountability are introduced at the organizational level. This type of development is at par with the demands for democracy and accountability that is taking place at the national level.

In both Hyderabad and Kampala there was evidence of a new culture at their utilities which put emphasis on customer service. The literal writings on the wall put emphasis on holding customers in high esteem. Moving towards the use of risk management tools seems a natural progression for these organisations in their efforts to focus on customer service. The internal changes that have taken place in these organisations have led to more international cooperation and exposure for these utilities.

Both utilities in Hyderabad and Kampala have undergone extensive change in the recent past. The similarity in the change process is striking. Both organisations, driven by both external pressures and new leadership, have managed to create a customer service concept. This shows change in organisational culture to accommodate customer service and overcome resistance to change. The concept of customer service has sunk well with both HMWSSB's and NWSC's employees and customers and is quiet clear on their thoughts. Physical evidence such as posters, website, and customer focused visions and objectives, clearly attest to this. The replication of the applied change mechanism for the purpose of WSPs can have very positive effects.

8.4 Overview of WSPs in Study Areas

8.4.1 Reception, Perception and Implementation of WSPs

The WSP concept is fairly new in the global arena and barely at the pilot level in developing countries. Hyderabad was chosen as a pilot city following consultations between USEPA and WHO with the government of India. Although the evidence shows a warm reception of the concept by top leadership, there is an indication of lukewarm reception by middle managers and lack of awareness at the staff level. The middle managers, who are engineers, believe they need to deliver the water first. The frustration politely expressed basically means 'we don't have the capacity to keep up with the demand, and you are talking about keeping the supply safe'.

The choice of Kampala as a pilot site was research driven. This reflects on the organisation's learning culture in which publication of books and journal papers is encouraged by top leadership. The WSP concept was warmly received from top

management, accepted and implemented by middle management and awareness created at staff level. Even at the branch level managers are aware of the concept.

Spanish Town was chosen during a PAHO, CDC, and USEPA led workshop in the LAC region in which Jamaica's representatives suggested Jamaica to be the pilot site for the region. The decision to select Spanish Town as pilot area was influenced by the challenges faced at its water treatment plant and the adverse effects of human activities on its water source's large catchment area. Although top management had reservations initially, the idea was later fully accepted and adopted.

Lack of warm reception was influenced by doubts at the local level on capability to implement the WSPs. There were concerns regarding the know-how and the state of the facilities. At the same time there was a feeling of "we are already doing it". While I can sympathise with the need for capability required to implement WSPs in developing countries, the lack of capability cannot be used to preclude the use of this tool. As shown in section 2.3.1, this tool while designed as a preventative measure, it can also be used for diagnostic purposes, and can help substantiate and prioritize capital improvement needs and leverage financial support for funding purposes.

8.4.2 Scaling Up of WSPs

The catchment to consumer approach of WSPs presents challenges in choosing the right path for its scaling up. The path to be taken has to have the capacity to handle catchment concerns, utility departments' deficiencies and consumers' consumption. This means that not only should each WSP be considered as being unique and requiring the application of certain scaling up path or paths, but also, each step of the implementation process should be considered as such.

Assessing WSPs within Uvin's (1995) scaling up typologies (Table 2-5) there is evidence of important progress. Quantitatively, WSPs have spread to several developing countries though mostly through piloting, itself an important precursor to scaling up. Functionally, WSPs are moving beyond the initial concentration on large water suppliers to involve small scale suppliers. Politically, the promoting organisations have been trying to engage politicians in the process. Organizational

scaling up has been taking place through the provision of support from international promoters, local environmental and academic organisations and also through the provision of training. This has also been taking place through networks such as PAHO.

Checking WSPs against the seven characteristics of successful scalability (Section 2.4.3) there are several reasons to believe the strategy stands a good chance to succeed in developing countries. For one, WSPs meet the credibility criteria because they are not only based on sound evidence, but they are also espoused by respected professionals and institutions. The process is also relevant and testable and its benefits easily observable. In addition, it also has several advantages over existing process. However, of the seven characteristics two might present a challenge for water utilities in developing countries. One, some utilities might find the process as not being easy to understand and install. And secondly, the concept of prevention might not be easily compatible with the established value, norms, and facilities of many water utilities in developing countries. In the next section I elaborate on these difficulties and discuss some important requirements for the successful scaling up of WSPs in developing countries.

- **Critical Requirements for Scaling Up WSPs**

WSPs are indicative of change in the management of risk in the water sector. The adoption of this process, no matter the state of the utility, is one step ahead compared to not having it in place. The successful scaling up of WSPs in developing countries will need time, resources and capacity. But more than anything else, scaling up is about political and organizational leadership, vision and values, if these are present and geared to drive forward individuals, institutions and bureaucratic and political processes (Hartman and Linn, 2008), then scaling up of WSPs will have a chance to succeed. In order for the scaling up WSPs to be successful in developing countries, the following issues will have to be addressed:

Clear Comprehension of What It Entails To Scale Up

For any process to be successful a clear understanding of what it entails is a must. For example, it has to be clear that despite of similarity in situations, one size does not fit all. Thus, the scaling up effort has to be tailor-made for its purpose. Another important

factor which is often overlooked is the need to understand scaling up takes time and hence long term commitment is required. Not to be forgotten is the much emphasised need for sound planning (Hartmann and Linn, 2008; Cooley and Kohl, 2005; Binswanger and Nguyen, 2005; Davies and Iyer, 2002).

Proper Understanding of WSPs and Commitment to its Philosophy

Clear comprehension of the WSP processes and commitment to its values are fundamental requirements of its successful scaling up. Evidence from the field indicates there is some work to be done in this area. The following quotes illustrate this point:

"*WSP is nothing but locating and fixing leaks*" (senior utility manager)

"*We finished the WSP*" (treatment plant employee)

"*I would say that we are implementing it, whether we are doing it the way it is supposed to be done is another issue*" (utility manager)

"*WSP is a challenge because from an engineering point of view they still don't believe water is both quality and quantity*" (quality control manager).

"*Engineers believe first deliver then improve*" (lab technician).

Some employees felt WSP was an add-on exercise and that they were already doing everything. Also there were instances where non-managerial staff working at treatment plants had never heard of WSPs despite the piloting process being conducted in their plant. The scaling up of WSPs will be a change process, and for change to be effective all those involved in the provision of water will have to understand the process and subscribe to the philosophy.

Leadership

The need of a "champion" for effective scaling up is widely recognized and an 'accepted fact' in the literature (e.g. Simmons and Shiffman, 2006; Hartman and Linn, 2008). The scaling up of WSPs will require champions who create and sustain change momentum. Leadership will not only be required among the implementers, but also among promoters who are important drivers in the scaling up of WSPs. Given the long-term nature of WSPs nurturing of future leadership is also important in order to avoid a leadership vacuum.

Incentives and Accountability

Incentives and accountability are key ingredients of successful scaling up (Hartman and Linn, 2008). Implementers must show accountability to both customers and promoters. This can generate more goodwill, for example in gaining access to more funding opportunities and increased willingness to pay. The utilities should also give staff incentives to perform and achieve WSP goals. One of the WSP project utilities used incentives such as delegation of responsibilities, financial bonuses and recognition for meeting goals. Managers were proud to show trophies they had won.

Political Stability, Supportive Policies and Political Commitment

Lack of stability is a major deterrent to development in general and can affect the scaling up of WSPs in similar manner. The changes being promoted by WSPs will require supportive policies such as the inclusion of WSPs in the drinking water regulations. Both promoters and implementers should ensure politicians understand what WSPs are about and secure their support.

Consideration of Cultural Factors

Culture can impact on the implementation and scaling up of WSPs in many ways. For example, different cultures perceive risks differently and their perceptions do influence how they respond to these risks. Understanding of a community's values, norms and beliefs will enhance the chances of scaling up success. For example, knowing that it would be a challenge to create a preventative mindset in a culture where beliefs are mostly fatalistic and the mantra is "whatever is meant to happen will happen" can lead to the adoption of new strategies.

Extensive Infrastructure Development

Poor infrastructure is a persistent problem in developing countries. The need for infrastructural development in the water sector is evident especially in the low income areas. Besides improving delivery capacity, the increasing of processing and supply levels is also required in most cases. Infrastructural improvements increase the chances of a WSP to succeed as seen in different WSP projects. As one manager put it "After all is said and done, having the capacity to supply the needed quantities of water will be a

decisive factor in whether WSPs will be successful in developing countries" (senior manager). This can also be linked to another manager's comment "When there is no water, quality becomes a secondary issue" (utility manager). However, it is important to understand that starting a WSP without the necessary infrastructural improvements, despite its difficulties, is still a step ahead.

Sustained Collaboration, Strategic Partnerships and Multi-stakeholder Involvement

Long-term support from promoters will be needed to ensure successful scaling up of WSPs. Researchers indicate "Experience clearly demonstrates that scaling up is highly unlikely without some level of active support from the originating organization" (Cooley and Kohl, 2005). In some of the WSP projects there was no evidence of involving stakeholders from the catchment. This observation was also shared by one promoter who pointed out "The catchment is often left out". Catchment communities will have to be involved in the process. Challenges associated with the identification of strategic partners, task force membership and coordination of meetings will have to be overcome. Giving the example of Hyderabad where HMWSSMB was willing to work on WSP portions under its jurisdiction yet less keen on coordinating with other stakeholders in the catchment because of underlying tension, Wilusz (2009) indicates "Legislation can be especially effective in forcing stakeholders to work together on a WSP – a common challenge when implementation is voluntary".

Improved Organisational Capacity

For effective scaling up of WSPs many water utilities in developing countries will have to substantially improve on their organisational capacities. Important aspects of such improvements will be the filling of gaps in knowledge management and better training for employees. The following quotes identify some of the challenges being faced by utilities in this area:

"*People do not have a reading culture and the literature is shelved*" (Promoter)

"*There is no in-house training*" (utility manager). "*In my experience, operational staff are quite good at collecting data – but they think that this is the end of the process and data is not used – it is collected, stored and collects dust!*" (Promoter)

In one of the project areas training was considered to be a punishment post where those who are being sidelined were sent to. Clearly, such attitudes will have to be changed. "Scaling up needs organizations with the institutional and human capacity to deliver on the scaling up mandate" (Hartman and Linn, 2008).

Financial Capability

The scaling up process will require money. In addition to sourcing funding from local governments, and international organisations most utilities will have to improve on their revenue collection.

Monitoring and Evaluation

Monitoring and Evaluation are central to WSPs. Rigorous evaluations and reliable monitoring systems which provide constant feedback are also considered to be vital in successful scaling up (Mansuri and Rao, 2004; Hartmann and Linn, 2008).

8.5 Culture and the Implementation of WSPs

The findings point to almost a dozen important ways in which culture can impact on the implementation of WSPs. In addition to discussing these findings, this section also reflects on the features of these factors such as: presence of cultural dimensions and concerns beyond culture, ultimate and proximate influences, and intrinsic and non-intrinsic culturally related practices.

- **Factors with Ultimate Influences**

Factors that have ultimate influences are linked to fundamental beliefs and convictions held by the participants regarding water. These inherent factors, discussed below, determine the perception of water and influence decisions such as bill payments and water consumption.

- ***Belief that water is a source of life and a medium for purification***

All the participants indicated respect for water in their belief systems. This reverence is linked to the belief that water is a source of life and a medium for purification. There is a clear recognition of the link between water and life.

In the words of one of the participants: "Before water there was no life and if there is no water there will be no life" (ICI37, 2008). The findings indicate a theistic linked conviction on the capacity of water to purify spiritually in addition to its daily uses in physical cleansing. Some of the participants indicated water literally washed off sins from their bodies. Indeed, the literature also points to a universal reverence for water among most of the world's major faiths (e.g. Priscoli et al 2004). For example, the Hindu Holy text known as Manusmriti has clear indication on how to interact with water accentuating this reverence.

- ***Belief that Water should be Free***

The belief that water should be free was expressed by the majority of customers in all the three locations. This belief was mostly held in Hyderabad at 90 % compared to Kampala and Spanish Town at 80% and 65% respectively. The basis for this belief was mostly the conviction that water is a God given gift, and a necessity for life. The variations in the rate of this belief in the three locations could be indicative of different degrees of religiosity. Even within each case this belief was strongly expressed by some than others as seen in the example of the Hyderabad resident who set up a drinking water dispenser for sharing water with others outside his gate (Figure 5-6). Also in Hyderabad, the utility has been pressured to keep tariff rates low by elected officials, who consider water to be a social good that is to be provided at low or no cost to residents, especially the poor (Davis, 2005). This conviction is so strong to the extent that the politicians have obstructed the dismantling of illegal connections by employing tactics such as organizing residents to confront and threaten employees enforcing disconnection rules or influencing the transfer of such employees to undesirable departments as punishment. The figures from Hyderabad showing nearly 25,000 illegal connections (Ramavat, 2010) and bill payments by only 50% of metered users (Celio, 2007) can also be taken to be indicative of this conviction,

This finding shows a link between willingness to pay (WTP) and the belief that water should be free. Some customers attributed the lack of WTP to this belief. One such example is that of a customer in Spanish Town who considered illegal use of electricity as theft but did not think the same of illegal water use. She argued that stealing

electricity was against her faith, but illegally taping into the water network was not because water is a gift from God.

At the three utilities implementers recognised the lack of ability to pay by some customers, however, they were quick to differentiate this inability with willingness to pay. They argued that the payment of water bills was not accorded the priority it deserved by many. The most thought provoking examples given to support this assertion come from Kampala where nearly half of the outstanding arrears are from government ministries. Here there are examples of many well-off segments of the society being disconnected for non-payment.

This impact has to be viewed within the context of the wider debate on whether water is a commodity or a human right. Two aspects of this debate that need consideration are the argument of whether to view water as an economic good or not and the plight of the poor who cannot afford payment of water tariffs. When it comes to the poor, it has been established that "The very poor actually pay high prices for water, though their costs are often hidden... and "... the poor often pay a high unit cost as individuals" and that large supply systems have the potential of reducing these individual unit costs. (Priscoli et al 2004).

On the argument of whether to view water as an economic good or not there are two interesting views. One is the view that as water scarcity continues to increase, these ideals might change; "water becomes an economic good when it becomes a scarce resource" (ADB, 2003). The other argument is based on the "claim that fostering the notion that water is a commodity moves public perception away from the reality of water as a common good and from a sense of common duty and responsibility toward water" (Llamas, 2003). On the first argument, while it is true that scarcity might change these ideals, scarcity will also come with many more problems. As such, the issue cannot be left for scarcity to resolve. The second argument implies that the minute water is seen as a commodity caring for it will stop. This type of view is dangerous because it holds water providers hostage and is not necessarily true. Considering water as a common good but its production as an economic good as suggested by Priscoli et al (2004) can reconcile these two opposing stances.

Many participants invoked theistic reasoning to justify their belief that water should be free. For example, some argued that in Islam water is considered to be a common good that should not be paid for. The arguments posed by these participants were similar to those used by members of Islamic countries to argue against principle 4 of The Dublin Statement on Water and Sustainable Development which recognised water as an economic good. However, as shown by Al-Jayyousi (2001) this principle is not in conflict with Islamic teachings. Using this belief to justify non-payment or illegal tapping deviates from notion of pay for work and property rights in Islam. Even though such reasoning can be challenged based on the justifications being used, for the sake of argument lets accept it and pose the question "Ok, water is free, but should one not pay for its delivery and its safety?

One way to address the challenges posed by the belief that water should be free is acknowledging that water is a free gift from God and explaining to the customers that the processes involved in its abstraction, processing and delivery costs money. Linking payments to service delivery will be educational and enlightening and might counter such beliefs. However, whether customers buy this argument or not will be highly dependent on the quality of service affecting parameters such as availability and quality of water. This leaves water utilities in a paradox because achieving such parameters in the first place is highly dependent on tariff collections.

Currently there are several activities aimed at dealing with illegal connections in Hyderabad, Kampala and Spanish Town. These efforts include educating the public about the laws, amnesty periods for those with illegal connections and customer audits. The example given above of the Spanish Town customer who considered illegal use of electricity as theft was recorded at a time when there was a country wide campaign by the electricity company to curb illegal use. The messages on billboards and TV commercials were designed to associate illegal use of electricity with theft. Perhaps the customer's view is an indication that the campaign was working. As seen in the Spanish Town case, some customers think the utility is making profits from selling water and they feel this is wrong. Educating the public on the financial challenges facing the utilities might change these negative perceptions.

- ***Aesthetic Preferences***

Most customers indicated using aesthetic preferences in judging if their water was safe to drink. They mentioned the appearance of water as their first indication of safety followed by odour and taste. The customers mentioned they believe safe water should have no colour, smell, or taste. In addition to these aesthetic considerations, some customers have improvised other ways to judge water safety. They indicated listening to the tap as another strategy for judging water safety. One such customer in Spanish Town explained: *When the water is safe, I can tell from the sound of the tap. The days when the tap starts making funny noises I know that day water is not safe* (JC13). Narrating this story to the utility manager led to the revelation that the utility had some difficulties with water pressure.

Findings on aesthetic preferences indicate one important concern for WSP implementation. This regards chlorine. Some of the customers consulted for this study (50% Hyderabad, 90% Kampala, 70% Spanish Town) raised objections to the smell and taste of chlorine. Most of these customers indicated boiling their water. A promoter commenting on a WSP pilot in Guyana mentioned "*Many people reported that the reason they considered their water unsafe to drink was the taste of chlorine; therefore, the water utility was hesitant to chlorinate to an effective level*" (Corrales, 2008). The refusal to drink otherwise safe water because of aesthetic reasons has been variously noted. One of the most common reasons cited for such refusal is linked to the use of chlorine as seen in several studies (e.g. Sobel et al, 1998; Olembo et al, 2004; Kirchhoff et al, 1985; Makutsa et al, 2001; McLennan 1998).

This finding raises a contentious issue because chlorine is the most widely used chemical in the disinfection of drinking water. The use of chlorine has certain side effects which might give some credence to some of the raised concerns. Chlorine reacts with naturally occurring organic material (NOM) to form disinfection by-products (DBPs). The most common DBPs are trihalomethanes (THMs) and haloacetic acids (HAAs) which can occur at among the highest concentrations in drinking-water (WHO, 2004). The formation of DBPs is contingent upon source water quality characteristics and the treatment process (Wang et al, 2007).

The risks associated with DBPs are not limited to chlorination but are also found in the use of other disinfectants. But it remains that disinfection is one of the most important processes in the production of safe drinking water. Other disinfection processes include ozonation, UV irradiation, chloramination and application of chlorine dioxide. The GDWQ advises on the use of measures to minimize DBP production in distribution systems that use a disinfectant residual. The guide also recommends the verification of chemical safety by testing for chemicals of concern at the end of treatment, in distribution or at the point of consumption depending on the likelihood of changes in concentration levels in the system. Clearly WSPs have an important role to play in the minimization of DBPs associated risks.

Nonetheless, it is important not to lose sight of the fact that the risks associated with DBPs are much smaller than risks presented by lack of disinfection. For example, a risk assessment of THMs exposure in Istanbul's water supply concluded that each year 5 of the 8 million Istanbul residents could get cancer from the daily intake of water (Uyak, 2006). Possible fatalities that can result from failure to disinfect the city's drinking water cannot be compared to this. It is imperative that disinfection is not compromised in the effort to control DBPs (WHO, 2004).

That said, "Utilities must achieve adequate treatment and disinfection to protect the consumers from pathogens and simultaneously reduce DBP formation" (Guay et al, 2005). Through the optimization of the treatment system the formation of DBPs may be controlled (WHO, 2004). Since many developing countries do require upgrading of their current systems or construction of new treatment plants, designs and optimal operations conditions that not only minimize the formation of DBPs but also ensure adequate microbial protection and low operational costs should be seriously considered. Affordability will of course be an important factor.

The challenge for utilities will be in providing adequate treatment and disinfection without compromising the aesthetic acceptability of their product. This is very important because "In extreme cases, consumers may avoid aesthetically unacceptable but otherwise safe drinking-water in favour of more pleasant but potentially unsafe sources" (WHO, 2004).

- **Non-intrinsic Factors**

Non-intrinsic factors identified in this study are two rituals in which the culture is not the problem but the water practices related to it are. These rituals, discussed below, are related to water pollution and the amount of water consumed.

- ***Pollution Causing Rituals***

The immersion of idols into water bodies is an example of pollution causing ritual observed in Hyderabad. Here one of the largest Ganesh festivities in the world is held to celebrate the birthday of the revered elephant headed Hindu god, Lord Ganesh. This ritual is performed on the 11th day of this annual festival. On this day, large colourful parades of song and dance are held around the city. The procession consisting of people, Lorries, trawlers and trucks carrying Ganesh in various forms and sizes culminates at the city's Hussain Sagar Lake. At the lake, several cranes are used to offload and immerse the gigantic idols. While I did not perform any tests on the water, recent studies on the lake indicate high mercury concentrations which can be attributed to the artificial paints on immersed idols (Suneela et al, 2008; Rao et al, 2004). This practice of immersing idols in water bodies such as lakes, reservoirs, ponds, rivers, creeks and canals is common among believers of Hinduism. Several other studies have also linked such immersions to pollution of water sources (Vyas et al, 2006; Dixit and Tewari, 2007; Pradhan and Latkar, 2008). The literature also identifies *Durga Puja* as another festival among Hindus in the immersion of idols into water bodies occur. Clearly this is a deviation from Hindu Holy scripture such as the Manusmriti which in verse 4.56 states "*Let him not throw urine or faeces into the water, nor saliva, nor (clothes) defiled by impure substances, nor any other (impurity), nor blood, nor poisonous things"*.

Another example of pollution causing ritual is seen in the dumping of dead bodies in India's Ganges River. There have been reports and images of partly cremated and completely intact human bodies floating in the river. Rituals in the Ganges are sometimes a source of pollution and at other times these rituals expose individuals to polluted water. Many Hindu devotees have become hesitant to cleanse themselves in the river because of the high levels of human and industrial pollution; some holy men

have threatened to commit the ritual suicide *jal Samadhi* in protest (Selemme, 2007). Some of the rituals in the Ganges also indicate cultural deviations. The partially burnt bodies and some of the non-cremated human bodies being thrown in the river is not in line with Hindu funeral rituals. Although such action might result from inability to afford the cremation, it still constitutes a violation of cremation rites. Clearly there is a room for government initiative to deal with this issue.

The pollution of water sources by idol immersion is as a result of the conversion of a family level religious ritual into an industrial scale activity. Both the Ganesh and the Durga Puja idols have been traditionally sculptured out of clay and decorated with natural colours such as turmeric. Nowadays, the idols are made of plaster of Paris which contains gypsum, sulphur, phosphorus, calcium and magnesium while the paints used contain toxic compounds of lead, mercury and cadmium (Pradhan and Latkar, 2008). In addition, the festivals used to be a family affair where small clay made idols were made and disposed of in a nearby water body as opposed to centralised immersion of very large, up to 50 feet (Reddy and Kumar, 2001), commercially produced idols. In essence, the water pollution problem emanates from the new forms of materials used and the celebration manner as opposed to the festival itself. This is acknowledged by India's Central Pollution Control Board (CPCB, 2010) which recommends the use of natural materials as stated in the old religious scripts for the production and decoration of the idols. The CPCB also recommends the placing of synthetic liners at the base of water bodies to catch the idols upon immersion and ease their removal. But then such a recommendation falls short of dealing with underlying issue and only provides a stop gap measure that in essence fails short of condemning the practice.

This finding could be used to symbolise the wider spread problem of water pollution. It could be argued that the pollution of water sources through activities endorsed by important social institutions could be indicative of larger underlying issues when it comes to pollution of water sources. As seen in the three cases pollution presents a challenge for the utilities. In Hyderabad unabated pollution from untreated domestic sewage and toxic industrial effluents have rendered several of Hyderabad's lakes, identified as potential sources of drinking water, unusable (Ramachandraiah and Prasad

2004). Out of River Musi's 256 km length, the 28 km section that passes through Hyderabad is described as the most severely polluted section of the river (Ramavat, 2010). In Uganda water quality at Lake Victoria's Murchison Bay has been deteriorating as result of pollution (Oyoo, n.d.) Inadequate waste management systems to support the increasing population and commercial and industrial activities in Kampala have led to increased volumes of urban waste entering the environment. Sewerage and other waste drain into the Navikubo Channel which discharges into Murchison Bay. For example, partially treated effluent from Bugolobi Sewerage Treatment Works is drained into the channel. In Jamaica pollution of underground and surface water is of significant concern to the NWC. In addition to posing health risks, poor water quality at source means high treatment costs for the NWC. Pollution in this area is caused by domestic, commercial and industrial activities. For example, some areas in the watershed have been severely degraded as a result of bauxite mining (EEM, 2007). The issue of contamination is made more pressing by the hydrology of this area. The Rio Cobre Basin is hydrologically a closed basin and any contamination of ground or surface water within the basin exits the basin via the Rio Cobre (Smith, 2011).

Pollution of water sources can render potential sources of water unusable, increases health risks and treatment costs for water utilities. Public education backed up by deterrence is required to deal with this challenge. The approach taken by park rangers in New York State provides a good example of dealing with pollution caused by rituals. The story reported in The New York Times (2011) indicates that the growth of Hindu population in Queens has been matched by growth in ritual debris comprising of food, clothes, statues and cremation ashes, in Jamaica Bay. In dealing with debris from offerings made in Gateway National Recreation Area the park rangers have engaged the Hindu community through their leaders and priests. The rangers explained the ecological impact of the debris on the areas fragile ecosystem to different congregations while using the Hindu tenets of respecting the earth to boost their message. They also joined a panel of priests on a local television channel to further reach out into the community. The park officials encouraged members to pray at the waters but to leave no offerings for the gods. "Some priests have suggested compromises, like dipping the coconuts in the water seven times, then taking them home to throw away." Although

many Hindus have complied others unaware of the rules and some refusing to obey necessitated the handing out of $75 fines. As a result more others are complying and are taking their offerings back home after the rituals. In addition, some of the community leaders and activists have rallied up members of their congregations in a campaign to educate and clean up the area.

As pointed out by Priscoli et al (2004) nearly 90% of the wastewater in developing countries is left without treatment therefore it is critical that "At a minimum, drinking water standards must be established and enforced and water sources must be protected from pollution and industrial residue". In dealing with this problem there is an opportunity to deal with pollution causing rituals through engagement and harnessing the support of leaders of different established cultural institutions. This will also offer the prospect of a wider campaign to reverse the general pollution of water sources.

- ***Excessive Water Use in Rituals***

The Islamic ablution commonly referred to as *wudhu* is an example of a ritual in which there is excessive water use. Muslims perform wudhu at least five times a day, before each of the five daily prayers. This finding was first noted during a visit to a Hyderabad mosque where one of the care takers was asking individuals to reduce the flow of water on the taps. In a later interview with the elder, he said:
The prophet, peace be upon him, used to use around half a litre of water for Wudhu. Nowadays we have taps in the masjid and it is not like before in the olden days where people used water from a pond or a container. Instead of using half a litre, people open the taps all the way and use a lot of water. Some of them would be talking to their friends while the tap is running, this is not good. People come to the masjid for five prayers, now five times a day wasting all that water is not good. Wasting water is not allowed in Islam. This also makes the water bills very high. (ICI30).

This information prompted the author to investigate the amount of water that individuals used for *wudhu (*Appendix C). Findings show individuals used up to nine litres of water for the ritual. Subsequent follow up on the issue in other mosques in Hyderabad, Kampala and Kingston also revealed similar uses, practices and concerns. Table 8-3 shows water use in mosques in the three cases

Table 8-3: Ablution Water Use in Mosques

	Hyderabad	Kampala	Spanish Town
High	9	7	10
Low	4	3	4
Mean	5	4	5

Using the average usage, what this finding means is that each individual could be wasting nearly twenty litres of water per day during the *wudhu*. While this might sound like a small quantity, the number is significant in water stressed areas in which large Muslim populations live.

The excessive use of water in ablution is a deviation from the ablution water quantity guideline provided in Islamic teaching. The guideline in the Prophetic Traditions which Muslims follow indicates use of half a litre of water for this ritual.

This finding symbolises the wider problem of water wastage. Some implementers in the three cases have shown concern with the wastage of water indicating the need to manage demand. For example, in Hyderabad "*We are proving the 24 hours supply but it is very important that people reduce the consumption of water, avoiding wastage* (HII3). In Kampala "*When people are not paying the water bills or have it subsidized they tend to use water excessively*" (KII4). In Jamaica promoters have indicated that people tend to waste water especially when it is provided freely. Explaining this, it was pointed out that people used water from fire hydrants without any care or concern, wasting a lot of water. NWC indicates that "Water is often taken for granted. For many people, water comes from a tap and is viewed as an ever abundant and renewable resource. However, water resources are finite and are threatened by poor land management, and improper agricultural and industrial practices." (NWC, 2009)

The excessive use of water limits WSP efforts because efforts to meet demand shift the focus on quantity issues thus relegating quality aspects. This problem also poses another challenge pointed out by Shaban (2008) indicating that in most Indian cities the quantity of water consumed is not determined by the demand, but rather by the supply. This means the more water becomes available the more consumption will increase.

Water demand management has to be a key component of ensuring water safety especially given declining availability and increasing populations. Institutions such as mosques can be used to educate the public on the need for water conservation. Cultural values that promote the conservation of water can be used to bolster this message. Price mechanisms can also be used as appropriate tools in managing water demand. In addition to this, water utilities will also have to address transmission and distribution losses. Improving water use efficiency presents an opportunity to resolve quantity related challenges and enhance efforts in water quality management.

- **Practicality Emanating Factors**

Practically emanating factors are those factors which emerge as a result of the current water situation. These factors are necessitated by the desire and need to overcome the existing circumstances. Two of these factors, one concerning attitude and the other regarding practice are presented below.

- ***Deliver-First Safety-Later Attitude***

The findings indicate a 'deliver first, safety later' attitude among water engineers in the three utilities. This issue was brought to light by different quality control members in the three utilities. They pointed out that water engineers were mostly concerned with the quantity of water delivered while overlooking its safety aspects. Examples given to support this attitude include the laying of water mains in proximity to or criss-crossing sewer lines. "*The location of pipes in some places has not been well thought of, there are sewer lines crossing, I think more concern should be taken on where pipes are being laid*" (HII7). "*WSP is a challenge because still from an engineering point of view they still don't believe water is both quality and quantity. That is why you will find an*

engineer laying pipes passing through a drainage system which is collecting waste water and you will find sometimes again a pipe close to an onsite septic tank, so if you were to consider what you are transporting should be of good quality then the idea of locating this pipe should have come into your mind. When your focus is solely on whether the water is reaching the customer then any path through which you lay your pipes is ok, and that is the challenge we have at the moment" (KII9). *"The safety issue would be better achieved if the engineers had the same concerns, it would make a difference"* (SII2).

Driving this attitude, as explained by some, is pressure on the engineers to meet quantity needs. "*There is consideration, but sometimes there is pressure to meet the supply needs and the quickest or easiest route is taken* (HII15). Grappling with this challenge, one utility staff member made the following comment: *When there is no water quality becomes a secondary issue now, and that is a challenge which we have in developing worlds, how to keep the quality of something when what you are providing is not enough, so you end up going to quantity. We should change the way we think about of water, we should look at water in terms of quality and quantity. And if you look at water as quality and quantity, you find the system has to be monitored, the system is all interconnected. But if you look at water as quantity only then you find the engineering aspect over powers the quality* (KII3).

While acknowledging this problem, some have given it a pragmatic spin by invoking a Maslowian explanation indicating *"If you have no water to drink you can only survive for so many days, but if you drink water that is not safe, you might become sick, but survive many more days"*(HII6). While this might be true, it is still more preferable to survive those many more days with a reduced chance of illness and that is where WSPs come in handy. That said, the reality on the ground as seen in Figure 6-5 in which a woman fetches drinking water from an open drain in a Kampala slum, might be largely influencing this deliver-first safety-late attitude. Nonetheless it would be important to ingrain safety concerns among the engineers, perhaps changing this attitude to one of 'deliver safe water first'. After all, sole focus on an engineering approach "does not deliver the required efficiency gains" thus warranting the "need to have a mix of

orientations depending on where managerial weaknesses are most prevalent in the utility" (Mugisha, 2007)

- ***Storage Related Practices***

When it comes to water storage all the customers in Hyderabad, Kampala, and Spanish Town indicated having a storage tank or container because of intermittent water supply. The forms of water storage facilities used varied from 5 litre jerry cans to large rooftop tanks. Extensive household water storage in developing countries makes it an important piece in the water safety equation.

During this study several observations were made of individuals dipping hand held cups into storage containers. The most telling of these observations was during the Ganesh festival in Hyderabad. Both the water utility and the local government had set up 'water camps' to provide the public with clean drinking water. In both camps water was dispensed from 100 litre drums. The utility staff dipped their hands into the drums and scooped the water using plastic cups which they passed to the celebrants. In the other water camp, staff used hand held jars to scoop the water, but they poured the water into a dozen or so cups which everybody drank from. Some of the celebrants used these cups to wash their faces and rinse their mouths. This practice seemed not to bother anybody. Also in Hyderabad, another common practice observed by the author was the walking into a restaurant by individuals who drank the water straight from water jars on the table. This also went unnoticed and seemed not to bother anybody.

This public observation in handling of stored water by institutions that should be promoting water safety raises the concern that the safe handling of stored water is not at the desired level. At the household level in Hyderabad, 65% had a designated utensil for fetching the water. However, on several occasions I observed individuals dipping hand held cups into the storage containers. In Kampala observations of the water fetchers' hands coming into contact with the stored water were made in 25% of the households.

Hyderabad WSP project linked research found "Contamination of stored water samples significantly higher than source sample indicating intra-household contamination." and "low awareness regarding hand washing" (George et al., 2007). Similar findings have also been made in Kampala and Spanish Town. A promoter pointed out that *"Many times pollution takes place due to mishandling of water at the household level."(*HPI03). Spanish Town WSP linked research indicates nearly one quarter of stored household water samples had non or only minimal levels of residual chlorine of which half were positive for faecal coliforms.

The increased contamination associated with household storage is linked to the site of storage, type of container and handling practices all of which vary from one culture to another (Brick et al., 2004). For example, in South India, water stored in earthen pots is considered to be more pure compared to pots made of other materials. This preference was also noted in Hyderabad where some customers indicated they stored their drinking water in clay pots because it made the water cool and gave it a nice taste. However, lab experiments show water stored in such pots was found to have much slower decline of E. coli counts compared to water stored in other containers (Brick et al., 2004). A similar observation has also been made by other researchers (e.g. Banda et al., 2007) who also saw respondents dipping hand held cups into the storage containers. The methods that people use to store and retrieve their water can lead to contamination. In fact such contamination "... is a major cause of enterically transmitted infections in developing countries" (Brick et al. 2004).

In assessing the problem of household contamination findings in this research indicate the problem can be traced to intermittent supplies which necessitate household storage in the first place. It is also as a result of intermittent supply that some customers indicated using water from multiple sources, further increasing the chances of cross-contamination. The intermittence of water supply in most developing world cities causes the utilities to end up not being the sole providers of water. Other sources ranging from wells located on the premises, rain harvesting and water bought from vendors are used. The risk of cross contamination from these other sources remains high. Steady water supply negates the need for household storage and minimizes the likelihood of intra-household contamination.

Thus it can be argued the problem of household contamination can be eliminated or at least minimized through the provision of steady safe water supply. However, before the achievement of this noble goal in many developing countries there is a clear role for WSPs to play in influencing household storage practices.

Since secondary water storage is a key aspect of water use in many developing countries, it would be essential to address storage related practices. Practices such as dipping hands in storage containers combined with low awareness of hand washing can have severe consequences. It would be counterproductive to have a fully functional water system, backed up by a WSP, producing safe drinking water that ends up being contaminated during storage. Educating customers and creating awareness on contamination risks during storage and use should be important considerations in WSPs in developing countries. Practices such as covering storage containers or not and dipping hands into the containers to fetch water using tumblers need to be addressed to make WSP efforts successful. Given the intermittence of water supply in developing countries that necessitates its storage, instead of considering the taps to be the point of compliance as is the norm, it would be appropriate that this is shifted to their storage vessels from a public health perspective.

- **Factors with Proximate Influences**

Factors with proximate influences are neither directly linked to a water-related belief system nor limited to water but do have an immediate impact. Three such factors identified in this research are discussed below.

- ***Knowledge Management Practices***

Knowledge management is an important aspect to both culture and risk management. Since culture is both learned and dynamic the propagation of knowledge is central to both its survival and evolution. Knowledge management is an integral part in all aspects of WSPs. Findings from the three cases indicate gaps in the knowledge management practices of the three utilities. Although these gaps have different and varying effects on WSPs, they all do hinder successful implementation.

The first gaps became evident in the beginning of the WSP process in all three cases and these were lack of or outdated network maps and lack of or outdated data. Interestingly in one of the cases the lack of network maps was blamed on the colonial government that was there half a century earlier who allegedly took the maps away. There are instances where issues of concern are recognised and their knowledge held tacitly based on experience but the data is not quantified or the knowledge made explicit. Lack of primary data required before starting the process has been a challenge.

In addition, in all three cases there are indications of lack or low levels of data assessment and examples of reliability of collected data. For instance, in a study conducted during the Hyderabad WSP, it was found that the rate of acute gastroenteritis was several folds higher than that reported by the public health surveillance system. This discrepancy was attributed to the fact that "93% of cases treated by private providers were not covered by surveillance system" (George et al., 2007). Prior to the Bholakpur disaster of 2009 in which a dozen lives were lost and hundreds hospitalized in Hyderabad, data from the Institute of Preventative Medicine (IPM) lab tests indicated alarming levels of contamination (IPM, 2009). If this data was used for the purpose it was supposed to serve, the Bholakpur disaster might have been prevented. Clearly, professionals in these organizations need to be sharing and discussing the same real time data on risk indicators. The generation of reliable data and its conversion into useful and accessible information will play a key role in the success of WSPs in developing countries.

Where data assessment is conducted there are indications of low levels of sharing the information within the utility and between the utility and other agencies involved directly or indirectly in the process. In all three cases it was indicated that getting information from the different stakeholders was very difficult since everyone was busy with their own work. The sharing of information is an integral part in the creation of knowledge and an important precursor to the transfer of knowledge.

Knowledge transfer is a crucial step in the WSP implementation process. There are several constraints to the transfer of WSP knowledge that have been identified in this study most of which are linked to training, an important component in WSPs. These constraints are addressed below.

- **Lack of or low levels of training opportunities**

Training plays a key role in KM. However, the process is not available or of the required standard in some cities as indicated by some implementers.

- **Timing of training**

The timing of training can either make attendance difficult or easy. In Hyderabad it was indicated that the timing of some training activities could be changed such as those conducted during exhibition times.

- **Attitudes towards training**

In Hyderabad being sent for training is viewed as punishment whereas in Kampala training is considered to be an opportunity. For WSPs to be successful, training and knowledge transfer have to be at the core of the process. In Hyderabad people showed contentment with the level of training they received while in Kampala people indicated lack of enough training. Clearly, when something is wanted, more will be asked for, and when it is not wanted, there will be contentment with the least that is available.

One promoter mentioned the need of a mentality change and the viewing of training as a continuous process and not a onetime affair. He said that in India, as far as the utilities were concerned, training was seen as a punishment post. "There are administrative reasons why somebody should not be put into some field and they will be transferred to the training centre but that man may not be interested in training" (HPI05).

- **Lack of time to engage in training**

In all three utilities some of the staff indicated that lack of time presented a challenge when it came to attending or providing training. They pointed out that they were preoccupied with day to day activities.

Another promoter said training presented a challenge (HPI03). Once a few selected individuals were trained, the motivation of their colleagues and passing on of the newly acquired skills was a challenge said the implementer. He also stressed the need to have IT capacity within the organisation because for one, highly detailed mapping required for WSP would become almost impossible without a computer.

- **Attitude towards training material developed overseas**

Some implementers and promoters in Hyderabad indicated the need for a locally developed WSP guideline. They pointed out that in India; procedures from outside the country were not well received. This 'not invented here' attitude limits openness to knowledge and act as a constraint to knowledge transfer.

The advantage of acquiring knowledge from WSP promoters is recognised, but at the same time some of the promoters' views are questioned. The following quote illustrates this point: "International organisations bring the advantage of getting a body of expertise to tap from, but they fail to appreciate local conditions; they should understand the local conditions and the social-cultural aspiration of the people" (KII4). These aspirations include the desire to be 'independent'.

- **Preference for oral delivery of training**

When it comes to the transfer of WSP knowledge, differentiating between oral societies and those which have a culture of reading and writing will make a difference on how the message is received. A manager in Kampala indicated the staff he worked with would prefer to be called into a meeting and be given a presentation on new ideas rather than being provided with written material. He pointed out that "People do not have a reading culture and the literature is shelved" (KII10).

- **Frequent Transfer of Employees**

Learning on the job is central to knowledge transfer and the frequent transfer of employees interferes with the smooth transfer of knowledge between them. For example, the rules in the Indian system are such that one had to be transferred every three years. As pointed out by one promoter, this could have a devastating impact if all the employees trained on certain skills were all transferred at the same time and replaced with others who did not have the same skills. In fact this was the case in Hyderabad's Serrilingampally pilot area where the manager was transferred leaving the pilot area with nobody skilled in WSP.

The gaps in knowledge management practices described above are a deviation from desirable knowledge management practices. These deviations are not in line with

knowledge management guidelines and some of them deviate from traditional customs on knowledge management such as the transfer of tacit knowledge.

Most developing countries are weak in the all the main processes of KM: data collection, generating information, and creation of knowledge. For WSPs to be successful, knowledge management has to be at the core of the process. In many WSP pilots, lack of primary data, required before starting the process, has been a challenge. Clearly there is a need to encourage and facilitate the collection and analysis of data. The access to this data by different stakeholders can be facilitated through the creation of online data depositories to which all have access. For WSPs to be successful, training and knowledge transfer have to be at the core of the process. When it comes to the transfer of WSP knowledge, differentiating between oral societies and those which have a culture of reading and writing will make a difference on how the message is received.

- ***Authority Orientation***

Authority orientation refers to the propensity to relate to others according to their rank in a social order and high levels of power yielded by authority figures. At both the customer and implementer levels there were indications of high levels of authority orientation noted through interviews and observations.

At the customer level most customers indicated authority figures at the household level to be the main bread winner or eldest parental figure. It was explained by most in Hyderabad (90%) and Kampala (80%) that the orders given by these figures were not directly questioned even in some cases where there were legitimate reasons. In Spanish Town, these numbers although still high (60%), they were significantly lower. At the community level they mentioned clan or tribal leaders, political leaders, religious leaders and government officials as authority figures. Again here there was some indication that they could not be directly challenged individually more so in Hyderabad and Kampala (80% and 70% respectively) than in Spanish Town (50%). For example, in Hyderabad one customer explained that they went to community meetings to listen and would not raise any challenge during the meeting. Also in Hyderabad, I observed an ‘auto’ (three wheeled scooter) customer who stepped out and moved into another

since it was taking too long to fill with passengers being told by a much younger conductor to move back and he obeyed with no fuss. The explanation given for this by an informer was that the conductor was the figure of authority in this instance. The authority figure in essence is approached diplomatically by the individual. Confronting the authority figure it was explained in the three cases would require a concerted effort involving several individuals.

Common among the authority figures was the power they yielded over those in their groups. This power, as explained by many, was based on the social status of these figures. In addition, it was also explained by some that the basis of this power were a combination of fear and respect.

The authority figure is considered to be the main point of reference and is considered to be the person who can solve all matters. For example, a woman interviewee in Hyderabad insisted that details of a male household member be recorded as the interviewee despite his lack of participation in the interview because he was the authority figure in the house. During an interview with a branch manager in Kampala a customer walked into the office asking to see the manager and did not want to be served by the front desk staff. The manager explained that there was a perception where people feel that it is only the manager who can handle their concerns. In Spanish Town this was less common and was mostly shown in the ubiquitous references being made to the ‘big man’ or the ‘big boss’.

At the utility level authority orientation also played out in similar ways. In most developing countries students are taught to stand up for their teachers whenever they come into the classroom. In a similar manner, all HMWSSB managers and employees at a WSP workshop attended stood up whenever the MD entered the conference room and remained standing until he took his seat. During visits to HMWSSB offices it was common to see junior staff saluting, military style, to their managers. Some HMWSSB managers pointed out that there was no staff disagreements and that orders were given and taken. This high level of respect was also portrayed by managers towards the MD. While junior staff in HMWSSB would stand stiff and salute their managers as if they were army officers in uniform, all NWSC offices had the MD’s portrait hanging from

the wall. In Kampala all interviews and most conservation did not pass without reference to the MD portrayed as a father figure. In Kampala managers considered support from senior leadership to be vital indicating lack of such support meant not being able to win. In explaining this a manager used an analogy of a military system indicating "*At the branches we are just like soldiers at the forefront vanguard, the managers at the head office are generals behind the scene and without their facilitation we cannot perform*" (KII3). Although a similar level of authority orientation was not visible in Spanish Town, it was common to hear references being made to the boss or the big man.

The fact that in Spanish Town the WSP pilot had to be delayed because of a change in government is indicative of where the ultimate authority remains. The need to involve local leaders and politicians can also be linked to authority orientation. The public ownership of these utilities and the fact that the ultimate boss is the government further necessitates this. The attendance of government officials as guest of honours in some of the WSP workshops held in these countries attests to this. Similar workshops held in developed countries, such as Bonn Network WSP workshop held in The Hague, do by and large take place as private business affairs needing no political presence to gain credence. In recognition of this, one implementer stressed the need to involve senior officials from the beginning of the WSP process. Things like having a signed letter from the municipal government indicating a commitment to the WSP process would have a positive impact on the process said the implementer (HII2).

High esteem for or fear of authority figures is common in many developing countries with varying degrees in different societies. Authority orientation in most developing countries is deeply ingrained in their cultures such that it becomes second to nature. In illustration to this, a colleague from Nigeria who was meeting her supervisor for introductions and orientation kept using the word 'sir' in every response she gave, upon which the supervisor told her that as part of the university culture it was not necessary to say 'sir' and that people referred to each other using first names. Indicating a deeply embedded culture of authority orientation, the colleague responded 'okay sir'. In the three cases, titles of respect were more used in Hyderabad and Uganda to address

seniors at both the utility and in the community. In Spanish Town it was gender titles such as Mr. and Mrs. that were used.

Authority orientation can be closely linked to Hofstede's (2001) power distance dimension defined as "the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally". The disparity between the three cases showing Hyderabad and Kampala being more authority oriented than Spanish Town can be explained through the scores of the respective countries on the power distance dimension. On this dimension Jamaica scores low (45) compared to India and East African countries (77 and 64 respectively). These scores explain the informal attitude towards the managers in Spanish Town compared to the salutes in Hyderabad and the analogy of military generals used in Kampala. High scores in this dimension mean that "Communication is top down and directive in its style and often feedback which is negative is never offered up the ladder".

In many developing countries administrational institutions are generally weak and emphasis is put on leadership instead of the institution. Authority orientation can either have a positive or a negative effect on WSPs depending on the leaders' disposition towards WSPs. The amount of commitment and support from leaders can determine success levels in implementation. While it is generally crucial to secure such commitment and support, it is more so in developing countries where there is an indication of high levels of authority orientation. The public ownership of these utilities also adds another dimension in that the requisite leadership support is not limited to the utility leadership but also to the political masters that make the ultimate call.

The development of sustainable WSPs will need functional institutions. At the same time it is important to acknowledge the role of strong leadership, and not to dismiss it such as the case in Obama's assertion, "Africa doesn't need strongmen, it needs strong institutions" (Obama, 2009). After all, it is through strong leadership that strong institutions are made.

In the meantime, we have to concentrate on the fact that "Implementation of the WSP approach requires both financial support and encouragement from senior management

within a utility**"** (Bartram et al 2009). This recognition of the need for support is also crucial in knowledge management, an inherent part of WSPs and of which many parallels can be drawn with. As pointed out by Leidner et al (2006) in bureaucratic cultures the endorsement of senior management is of high importance in Knowledge management.

- ***Corruption***

Findings in this research indicate perception of prevalence of corruption in India, Uganda and Jamaica. Most of the customers and implementers considered corruption to be a widespread problem in their countries. The promoters also considered corruption to be an issue of concern in these countries while also pointing to its pervasiveness in many other developing countries. Proportions of customers considering corruption to be widespread in their countries are 90% in Hyderabad and 92% and 94% in Kampala and Spanish Town respectively.

The language used by some customers to describe corruption was at times full of emotions and symbolism. For example, "*When you have these big diseases which infect people like AIDS and cancer, you die a slow and painful death, corruption is destroying us like that"* (KCI49). The numbers of implementers considering corruption to be widespread in their countries were similarly high (Hyderabad 80%, Kampala 92%, and Spanish Town 84%). The indication of corruption prevalence in these countries is relatively comparable to high perception of corruption as shown by their corruption perception index (CPI). Transparency international annually publishes the perceived level of public sector corruption using a scale from 0 (highly corrupt) to100 (very clean) and the scores for these countries are: India- 3.1, Uganda 2.4, and Jamaica-3.3 (Transparency International, 2011).

Customers considering corruption negatively affected their water provision were 70% in Hyderabad, 65% in Kampala and 90% in Spanish Town. The considerable drop on customers views on corruption prevalence in Hyderabad and Kampala compared to its negative impact on water provision could be indicative of better tackling of the issue at the utility level in these cases. When implementers were asked about corruption at their organizations many portrayed tension or anxiety. However, most of them (80%

Hyderabad, 100% Kampala, 90% Spanish Town) acknowledged it was a problem they were dealing with.

Despite finding consensus on the prevalence of corruption in India, Uganda and Jamaica, this research shows a difference in its understanding among the participants. Where 80 % of the customers described corruption in terms of bribery, 75% of the implementers and promoters defined it in terms of misuse of public office for private gain. This can be an indication of varying degrees of awareness on the subject or an expression of understanding based on daily encounters on the customer's part. Perhaps this can be termed lay and professional understanding of corruption.

Corruption in developing countries has led to the erosion of essential checks and balances which create and foster enormous distortions in various institutional processes (Egbue, 2006). Corruption is ubiquitous in developing countries yet given its secretive nature, it is not easy to find direct evidence of this activity. In many developing countries corruption touches all facets of life. For example, on the way to Uganda I found that corruption culture is entrenched in the Kenyan system to the extent that a person coming into the country would be welcomed by bribe demands from immigration officers and would continue facing such demands almost whenever in contact with government employees. In Uganda, India and Jamaica evidence of corruption culture was not as openly visible as in Kenya. However, the author came across requests of baksheesh in India and request for assistance in Uganda from some water utility staff. The way the requests were made it was difficult to say with certainty that bribes were being sought after.

Customer interviews indicate demand and acceptance of bribery among frontline staff towards the avoidance of bill payments or disconnections and the speeding up of connections. The form of corruption described by customers from the three utilities was mainly petty corruption. Among the implementers there was hesitance to discuss corruption in their organisations. Reasons given for the lack of will to provide such information included confidentiality and possibility of interference with ongoing investigations. However, some acknowledged that the problem was present in their organisations and pointed out that steps were being taken to deal with it. For example

in Hyderabad they have installed automatic meter readers to curb corruption at the meter reader level.

During a customer interview in Spanish Town, a local resident angrily expressed himself in patois "*Wi tiad a di corruption!*" (SCI5, 2010) meaning "We are tired of the corruption!" This statement not only expressed the extent of the problem but also indicated the underlying emotions. Most of the participants considered corruption as being driven by greed. Other causes of corruption mentioned by the participants include covering up of illegalities, poor salaries and the taking of shortcuts to avoid laid procedures. Some argued against the idea of corruption being caused by poor salaries. They pointed out that many people lived on poor salaries and did not necessarily engage in corruption. They questioned why it was mostly those employed by government who engaged in corruption.

Despite hesitance among implementers to discuss corruption in their organisations, there are several media reports on corruption in all the three utilities. In Hyderabad, The Hindu (2010) reports the arrest of a HMWSSB General Manager by the Anti-corruption Bureau on charges of amassing wealth illegally. In a different story, the same newspaper reports the arrest of a technical officer from the same utility for demanding a bribe and accepting 2, 000 Rupees to facilitate water connection (The Hindu, 2010 B). In Uganda, The Monitor (2009) reports on the arrests of water officers for missing of funds and cheating customers by inflating water connection charges. Jamaica's daily newspaper, The Observer (2009), reports the arrest of a NWC team leader for writing false bills and collecting $1.25 million between 2005 and 2008. In the same story the newspaper reports the dismissal of another staff member for extensively using the company's fuel card to purchase fuel for private purposes. A report on corruption in Jamaica indicates the country's water ministry and the NWC to be among 99 organisations being closely monitored for corruption (MSI, 2009).

Media reports from Kampala show that corruption can reach as far as the MD indicating scribes from local newspapers demanded bribes from the head of NWSC (The Monitor, 2010). The corruption described in media reports is not limited to petty corruption but also shows other forms of corruption. The literature on corruption in the water sector also indicates the occurrence of various forms of corruption including fraud,

embezzlement, bribery, collusion, and nepotism (TI, 2008B; Plummer, 2008; Plummer and Cross 2007). The same literature also shows corruption can affect all the processes and sections of the water delivery chain. The recent controversy in Kenya surrounding the corruption connected to illegal settlement of the Mau forest complex, a catchment area for more than 12 rivers feeding six lakes (BBC, 2009) is one such example. The effect of 100 million indigenous trees being cleared on 100,000 hectares of the forest is being felt by 10 million people who depend on its rivers (ibid). In Spanish Town, lack of chlorination due to theft of chlorine cylinders and under dosing of chlorine was identified among other hazards affecting the system. Others (e.g. Priscoli et al, 2004) have attributed lack of planning to mitigate floods and droughts to a blend of corruption and lack of institutional capacity.

Combining participant opinions with media reports and others' findings on corruption in the water sector I think it would be reasonable to assert that corruption can impact on each of the main steps and aspects of WSPs from Catchment to consumer. The following excerpt from Uganda further highlights this point. *" ... between $5 million and $10 million meant to improve access to safe water for drinking in Uganda is lost to corruption annually... between 10 and 20 per cent of money given to contractors is spent on kickbacks, which significantly reduces the extent to which the contract can deliver on improving access to safe water and sanitation"* (The East African, 2009).

Juxtaposing corruption with the universal recognition of greed as a vice might explain why most of the customers in Hyderabad (85%) and Kampala (75%) did not want corruption associated with their cultures. In Spanish Town only 35 % of the customers disagreed with such an association. Here most of those who saw a link between corruption and their culture used their history of slavery to explain the link. In all the three locations those who did not see a link between corruption and their cultures indicated corruption was not part of their tenets be they Christian, Muslim, Hindu, Rastafarian, or African traditional religion. In essence they considered corruption to be a deviation from their cultural beliefs. Similar thoughts were also put forward by some of those who saw a link between corruption and their cultures. They argued that their cultures had changed to accommodate corruption.

Even though cultural aspects can be used to explain the culture of corruption in many developing countries, it can be argued that the underlying values and norms of these cultures do not support the ongoing corrupt practices. Take bribery as an example, while different cultural norms support the notion of exchanging gifts, the giving of bribes is a deviation from the underlying values. Distinguishing between gifts and bribes the former Nigerian President Olusegun Obasanjo says:

> I shudder at how an integral aspect of our culture could be taken as the basis for rationalising otherwise despicable behaviour. In the African concept of appreciation and hospitality, the gift is usually a token. It is not demanded. The value is usually in the spirit rather than in the material worth. It is usually done in the open, and never in secret. Where it is excessive, it becomes an embarrassment and it is returned. If anything, corruption has perverted and destroyed this aspect of our culture. (Transparency International, 2000)

Commenting on bribery, Egbue (2006) strengthens this argument by indicating "These demands, stipulations and specifications for gratitude for performance of official duties, have little or no bearing with traditional culture, and indeed constitute a major basis of corrupt practices of today." There is a clear distinction between culturally-linked gift giving and corruption among the masses (ibid).

The findings also show a difference in participant opinions when it comes to ideas for combating corruption. Suggestions by customers mostly voiced the need for punishing those who demanded bribes. Ideas by promoters and implementers were much broader and included aspects such as the role of leadership, the need for checks and balances, the need for involving the wider society through public education, and the strengthening of other arms of government such as the police and the judiciary. The difference in suggestions among the participants might reflect on their respective understanding of corruption.

Some customers and implementers in all three cases pointed to corruption as the main drivers of impunity. In explaining this link they pointed that corruption compromised the integrity of the politicians, the police and the judiciary. The increased vigilance in fighting corruption and promotion of accountability has resulted in creative ways to

circumvent the measures designed to tackle corruption. For example, the story on the arrest of HMWSSB for illegally amassing wealth on corruption shows that the wealth was registered in a friend's name. The existence of corruption affecting water provision in Hyderabad is not the main revelation from the case; the important finding is how the system set-up to encounter corruption was being circumvented. Tackling corruption will definitely require a multi-barrier approach to use a risk management term.

The fight against corruption will have to be tailored to the sector and to specific countries. This war will have to be fought from two different fronts, at the utility level and the national level. At the utility level, a top down approach will be appropriate where the organisational head takes a leadership role in fighting corruption. Creating a culture of accountability, integrity and transparency at the utility level can shape the attitudes, beliefs and behaviours of the utility staff. Organisational culture can influence ethical behaviour by assimilating diverse attitudes into a more universal standard of behaviour (Watson, 2003). While fighting corruption in the water sector has to be viewed within the wider context of the problem, the sector can take several actions to combat corruption and provide leadership and example to other sectors. A manager from Uganda's NWSC pointed out that *"Corruption is in every sector, but we are fighting it"* (KII6, 2009). The NWSC has demonstrated that by actively fighting corruption the effects can be felt within no time. The utility made its employees understand that "strategic oversight means keeping your eyes on but your hands off" (Berg, Muhairwe 2006). NWSC's ability struggle against corruption meant more visible progress and more goodwill from stakeholders further enhancing its capacity to supply safe drinking water.

At the national level, both top-down and bottom-up approaches will be required. The top-down approach will require strong leadership, laws and institutions to spearhead the fight. The bottom-up approach will require the involvement of the third sector, educational institutions, public education and campaigns. These should include public education on anti-corruption and its inclusion in civic and ethical education in both schools and other training institutions. Efforts at the utility level will also be contributing to this bottom-up approach. Integral to this approaches should be myth-bursting the cultural excuses used in support of corruption.

The spread of the corruption culture has been encouraged and escalated by the failure to institute appropriate sanctions against offenders (Egbue, 2006). Parties engaged in corruption have continued to rip the benefits of their actions with minimal or zero risk of facing any negative consequences. The main reason for this has been the failure to implement laws and rules designed to address corruption. This is linked to non-compliance discussed below.

- ***Non-compliance***

The findings indicate the existence of legal laws for governing society in all three countries. At both the public and utility level there is awareness of these laws. All the customers in the three locations were aware of the existence of water regulations. They described these laws as government laws or the water utilities' laws. When asked to describe these laws nearly all customers made references to bill payment and the prohibition of illegal connections. The findings also show there are several laws which both the customers and implementers indicated as governing them. These are: government laws, organisational rules, traditional customs, and religious laws. Most participants also indicated a belief in universal laws such as human rights. Despite high awareness levels of government laws, most of the customers and implementers thought these laws were followed sometimes at the societal level (Figure 8-2).

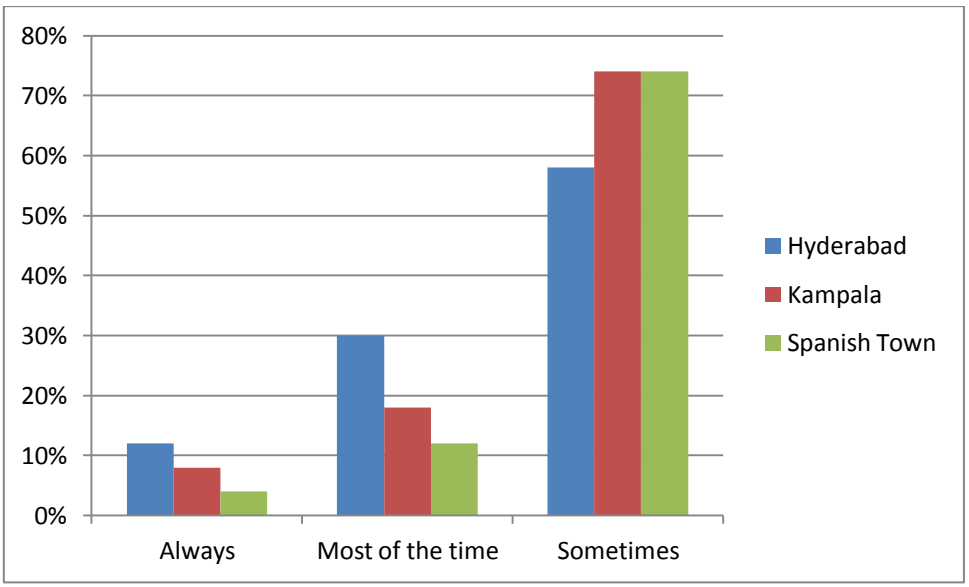

Figure 8-2: Perceptions of Compliance

At the organisation level implementers indicated generally there was compliance with both their internal regulations and the wider laws. Over 90% of them in each location thought most of the employees complied with these rules most of the time. Explaining why employees complied, they indicated deterrence measures such as disciplinary action and loss of employment. All the implementers interviewed indicated that if somebody was caught breaking the rules in their organisations they would be punished accordingly. Some implementers indicated that there have been dismissals and some ongoing cases dealing with such infractions. Media reports on the prosecution of corruption cases discussed above, give credence to these assertions. Some implementers explained it is in their external relationships that they had problems. They indicated frustrations in dealing with illegal use on the customers' part and also mentioned that sometimes infractions were the result of political interference.

The findings point to intra-utility, public and private non-compliance in all the three cases. Here non-compliance refers to disobedience of existing rules and regulations of which there is awareness. Intra-utility noncompliance can be seen in failure on the utility's staff to adhere to laid down guidelines, procedures and regulations. For example, documents linked to the Hyderabad WSP identify several cases of non-compliance with the Utility's guidelines such as non-uniform dispersion of chlorine, inconsistent alum dosing, non representative lab sample program, and inadequate chlorine residual monitoring. Examples from Uganda included inaccurate dosing of chemicals and irregular replacement of worn out parts. Similar examples of intra-utility non-compliance can also be seen in the Spanish Town case. The treatment of sewer effluents at these utilities is also non-compliant. The pollution and encroachment of water bodies in Hyderabad has been encouraged by the non-implementation of building regulations and pollution control laws (Ramachandriah and Prasad, 2004). This non-implementation occurs in spite of the existence of about 200 Indian Central and State laws aimed at protecting the environment (Sinha, 2001 cited in Ramachandriah and Vedakumar, 2007). An institutional analysis of wastewater (non) treatment and reuse in Hyderabad by Devi and Samad (2008) shows a wide gap between the declared rules and rules-in-use. Among the reasons attributed to the existence of this gap are insufficient organisational capacity in monitoring and implementation, low awareness levels among residents, and rules that have not kept pace with changing socio-economic conditions.

Public non-compliance refers to failure on government officials' part to comply with and implement rules that directly or indirectly impact on the provision of water and sewerage services. For example in Uganda: "*Sometimes the Land Commission issues land titles in reserve areas around the Lake, these areas are not supposed to be inhabited and were set aside for the protection of the lake, this is gazetted land, obviously this is not legal, and this is a problem that is affecting water quality because of the resulting pollution and it is increasing our treatment costs.*

Private non-compliance refers to commercial and domestic non-compliance. Despite their difference in scale, these two are similar in that they are both related to non-tariff payment and pollution. All the customers, with the exception of one in Spanish Town, indicated that their connections were legal. However, a substantial number in all three locations indicated they knew of someone with an illegal connection (Hyderabad 30%, Kampala 41%, and Spanish Town 47%). Reasons given to explain illegal connections include affordability, personal beliefs, and perception of high rates (Table 8-4).

Table 8-4: Reasons for Illegal Connections

	Hyderabad	Kampala	Spanish Town
Affordability	12%	30%	45%
Lack of Enforcement	40%	22%	36%
Corruption	23%	14%	44%
Personal beliefs	25%	13%	30%
High rates perception	20%	40%	10%
Errors in billing	10%	14%	17%

Personal beliefs can be related to the belief that water should be free. Although affordability and high rates can linked to the capacity to pay, the three cases show the existence of non-tariff payment that is not attributable to lack of such capacity by both commercial customers and well-off segments of society. As seen in the Kampala case "The urban rich and city business are the biggest defaulters and pilfer piped water by bypassing or manipulating water meters" (Daily Monitor, 2011) and 45% of the total arrears were from government ministries (NWSC, 2009).

In explaining why laws were not followed many indicated general disobedience of the law spearheaded by the guardians and custodians of the law. The most extreme examples were given in Spanish Town where the customers mentioned high numbers of extrajudicial killings with impunity by both the police and criminal elements. Some felt that this was not a deficiency in the law, but rather a lack of will to enforce the law.

Looking at the three cases there are several reasons for non-compliance which can be drawn out such as:

- **Overlapping of responsibilities among regulatory agencies**

There is an indication of overlap of responsibilities among some of the regulatory agencies creating difficulties in enforcing the laws. Lack of clear sole responsibility encourages passing the buck.

- **Lack of enforcement capacity**

Some implementers have indicated that they lack the capacity to enforce the law. For example in Uganda: *"It is not that we don't want to enforce the law, we have limited capacity, we don't have enough staff, we don't have enough resources and equipment to collect evidence and do assessment, our equipment is old and this makes it difficult to monitor some of the parameters, so this is a challenge".*

- **Unrealistic laws**

The laws which are on the books have to be realistic and reasonable in order to achieve their objectives. Seen in the case studies are two examples where this is not the case. In the Hyderabad case, the law requires that one seeks permission before digging any bore well and prohibits withdrawing water from below 500 feet of ground. Given the lack of reliable water supply in Hyderabad and dwindling water table the practicality of such a

law comes into question. In the Spanish Town case business establishments are discharging untreated effluent, waste water and sewage without a licence apparently because they were established before the effective date of licensing regulations. If this law does not govern the main players it is supposed to then what is its effectiveness?

- **Perception of different standards in enforcement**

Interviewees in all the three cases felt there was duality in the implementation of laws. In Spanish Town they described this duality in terms of 'big man and small man's rules'. In Hyderabad they called it 'one rule for the poor and another rule for the rich'; while in Kampala it was referred to as 'one rule for the powerful and another for the common man'. These perceptions created a feeling of "if some are exempt from following the law why should I?"

- **Corruption**

Many participants in the three cases linked non-compliance with corruption as seen in the above example on illegal connections. Ramachandriah and Prasad (2004) indicate that "Rampant corruption and the industrialist-politician-bureaucrat nexus have played havoc on water bodies". They explain the extent of the industrial lobby's power indicating that a sitting Judge of the Andhra Pradesh High Court was transferred overnight for giving closure orders to some highly polluting industries.

- **Disparity between formal and perceived normative regulations**

Both among the customers and the implementers the use of multiple sources of laws and rules were mentioned. Disparity between formal and perceived normative regulations can encourage non-compliance. For example, the perception that water should be free according to religious based normative regulations can induce non-payment of water bills.

The deviation in non-compliance does not need much explanation since failure to follow laws is what it essentially entails. On the prospects of a future in which the rule of law is followed, many customers showed pessimism. In Hyderabad some customers indicated suffering was a normal ingredient in the life of the poor. In Kampala, some were cautiously hopeful, whereas in Spanish time some thought their problems were insurmountable.

So what does the rule of law and non-compliance mean for WSPs? Accountability is an important aspect of risk management. In order for WSPs to be effective in developing countries there has to be means and ways for holding people accountable for their actions from the catchment to the consumer. Individuals or entities that pollute water sources or destroy catchment areas must be deterred by legal consequences which they would face for their actions. Similarly, utility employees in charge of storing chlorine or collecting water bills should also be held accountable for their responsibilities. Customers should also face consequences for corrupting utility employees through bribes or illegally connecting into the utility water networks. All these would be possible if there is compliance.

However, in many developing countries this is not the case. There is widespread evidence of disregard for the rule of law. Contrary to the rise of punitiveness in contemporary Western societies, a culture of impunity has continued to flourish in many developing countries. Perpetrators of crimes ranging from human rights violations to economic crimes have been beyond the reach of the law in many of these countries. When the state or political leaders are the biggest violators of the law they spearhead a culture of impunity that makes all aspects of governance impractical ensues.

Nonetheless, there are positive signs, as seen in the new push for the rule of law. Recent developments in many developing countries such as in the Middle East are indications of being fed up with impunity and a yearning for the rule of law. How successful this push would be is highly dependent on the aspirations and actions of citizens in developing countries. These can of course be mobilised and shaped through education, awareness campaigns, and support for activists.

At the sector level, the rule of law should be promoted through international water associations and professional networks. Top leadership at the utilities need to be men and women who understand the necessity of the rule of law, lead by example, and promote its application. They will have to take external pressures to infringe on the law head-on.

Although policy reform and legislation have the potential to encourage implementation and scale up of WSPs, all such efforts can be futile if non-compliance is not tackled.

Widespread non-compliance negates the effect of having regulations and legislation. Lack of compliance cripples WSP implementation particularly because lack of compliance nullifies efforts in risk management. The development of risk management function is dependent on each organisation's cultural and regulatory context (Dalgleish and Cooper, 2005).

8.6 Culturally Adopted Risk Management Framework

Towards the development of a culturally adopted risk management framework I propose a taxonomy which broadly the above identified factors as being either enabling, neutral, or limiting in relation to the implementation of WSPs. This taxonomy will be referred to as ENLINE in reference to the enabling (EN) limiting (LI), and neutral (NE) aspects of these factors. Before putting forward the framework I will present the features of the taxonomy.

- ***Enabling Factors***

Enabling cultural factors are those that support the WSP philosophy. The belief that water is a source of life and a medium for purification, and aesthetic preferences can be considered as such. Reasons as to why these factors are considered enabling are explained below.

The belief that water is a source of life and a medium for purification indicates a built-in reverence for water in different belief systems. This belief can be integrated into the WSP efforts in several important ways. It can be incorporated into catchment protection efforts, anti-pollution education, and conservation activities. The aesthetic acceptability of water is an important aspect in its use. Most of the indicated preferences do support the purpose of WSPs and do contribute to the risk management process. After all, these aesthetic preferences do raise valid concerns regarding water safety. Any variation in the normal appearance, odour or taste of drinking water may be indicative of deficiencies in the treatment process or changes in raw water quality (WHO, 2004). As advised in the GDWQ it would be wise for water providers to be attentive and responsive to local aesthetic preferences in the assessment of drinking water supplies and the development of regulations and standards.

- ***Limiting Factors***

Limiting factors have direct or indirect negative impact on WSP implementation. The findings indicate eight such factors (Figure 8-3) comprising of beliefs, attitudes and practices.

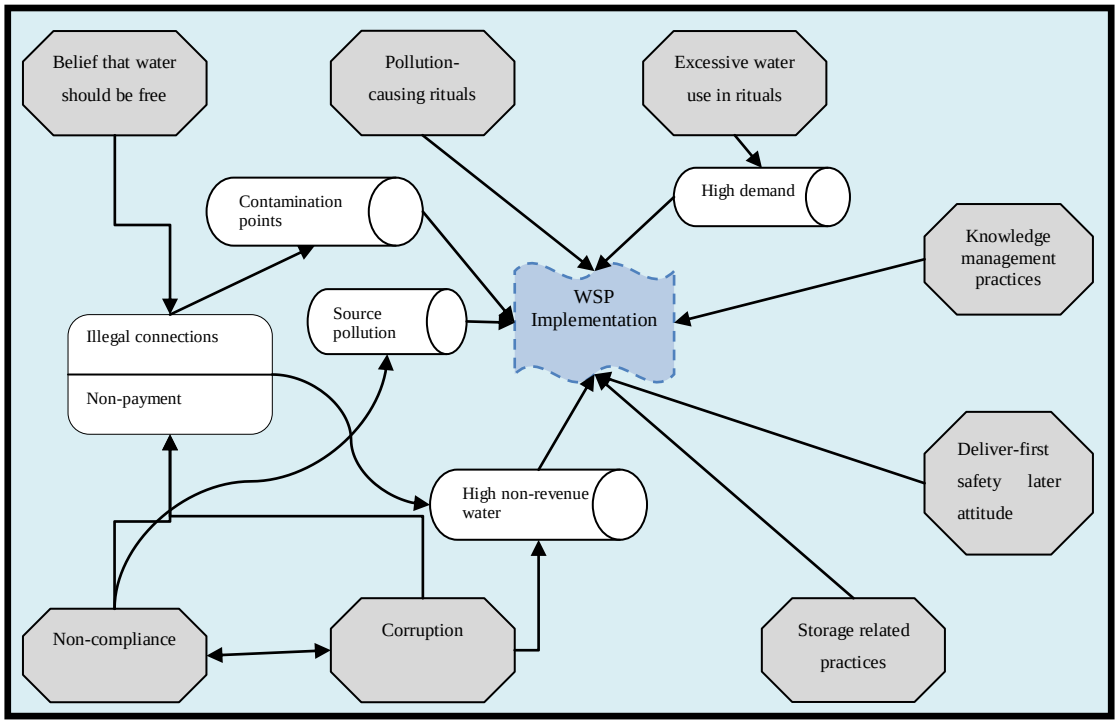

Figure 8-3: Limiting Cultural Factors

The belief that water should be free leads to non-payment of bills. In addition to affecting utilities income this also increases illegal connections which further intensify contamination risks. Pollution causing rituals negatively impact the quality of water at the source. These practices either make the water non-potable or dramatically increase the treatment costs. Excessive use of water during rituals increases water demand and puts more pressure on utilities that are struggling to meet their supply goals. This leads to more emphasis being put on quantity issues and reduces the focus on the management of water quality. The deliver-first safety-later attitude among water engineers is revealed through the laying of water mains in proximity to or criss-crossing sewer lines.

Although it emanates from a need to meet water demand, this attitude presents a clear risk to the delivery of safe water. Water storage necessitated by intermittent supply increases the chances of household contamination. Various practices of handling stored water observed in the field point to this. Knowledge management, an integral part in all aspects of WSPs, is hindered by the various gaps in the knowledge management practices of the water utilities identified earlier. Corruption not only reduces the income potential of water utilities but it can also negatively affect each of the WSP steps as explained earlier. Widespread lack of compliance at different levels, as shown above, diminishes accountability which is essential for WSPs.

A common denominator among all these factors is deviation from the cultural foundations on which they are based and the guiding principles on which they are built. Cultures do deviate from their norms and fall short of their ideals in different ways (Hooker, 2009). Table 8-5 highlight shows the deviations of the limiting factors and suggest ways to address these factors which are in opposition to the WSP philosophy and require changing.

Table 8-5: Limiting Factors, Cultural Deviations and Tackling Strategies

Factor	**Deviation**	**Tackling Strategy**
Belief that water should be free	Deviates from pay for work religious principles	Acknowledge that water is a gift from God and highlight the deviation and the need to pay for water supply
Pollution causing rituals	Deviates from religious guidelines on ritual performance	Highlight the deviation and build awareness through social institutions
Excessive water use in rituals	Deviates from religious guidelines on ritual performance	Highlight the deviation and build awareness through social institutions

Deliver-first safety-later attitude	Deviates from water safety guidelines	Highlight the deviation and provide awareness training for engineers
Storage related practices	Deviates from water safety guidelines	Draw attention to the deviation and provide awareness training
Knowledge management practices	Deviates from knowledge management principles	Highlight the deviation and provide training and necessary support for filling gaps
Corruption	Deviates from legal regulations and gift giving norms	Highlight the deviation. Promote of anti-corruption activities through leadership, legal reform, public education, and development of strategies towards achieving good governance.
Non-compliance	Deviates from voluntary and binding abidance norms	Draw attention to the deviation and promote compliance through legal reform and achievement good governance

- ***Neutral Cultural Factors***

Neutral cultural factors neither support nor oppose the WSP philosophy and their impact depends on their utilization in relation to WSPs. One such aspect identified in this

study is authority orientation. Winning the support of authority figures will be a crucial step in facilitating the adoption and implementation of WSPs.

- ***Risk Management Framework***

In this section I propose a framework for addressing the impact of culture on the implementation of WSPs. This framework is built on the following verities established in this research:

- Culture is a dynamic process
- Cultural change is not a pre-requisite in WSP implementation
- There are several inter-embedded levels of culture
- There are multiple sources of beliefs and normative
- Change in culture results from both internal adaptations and external influences
- There are enabling, limiting, and neutral aspects of culture in relation to WSP implementation
- Most limiting aspects are deviations from existing normative

The suggested framework comprises the following four steps:

Stage 1: Identification of cultural factors impacting on implementation

Stage 2: Classification of these factors using ENLINE taxonomy

Stage 2: Conversion of neutral factors into enabling factors

Stage 3: use of the enabling factors as a launching pad while highlighting the deviations of limiting factors to discredit them and instigate their change

Stage 4: Review and repeat of the process

As shown in Figure 8-4, the framework uses the principles of cultural impact assessment in identifying cultural factors impacting on WSPs implementation. The first step is twofold and concurrently occurring. It involves the classification of the factors using the ENLINE taxonomy and converting the neutral factor into an enabling factor. This conversion is critical because it wins leadership support and produces a local

champion. Having secured this, the next step will be dichotomous. The simultaneous occurrence of opposing activities in this stage involves the use of the enabling factors as a launch pad for the change while highlighting the deviations to discredit limiting factors. The use of pre-existing beliefs as a take-off platform can enhance the reception and adoption of the message. The message would indicate that the destruction or pollution of water sources and the misuse of water are not in line with the reverence for water held in the different belief systems. For example, incorporating Islamic teachings that prohibit defecation or urinating near a water source can be used in WSP efforts designed to minimize the risks associated with such practices. These activities not only soften the existing stance but also pave way for change. It is expected that this will lead to behaviour change as a result of belief modifications.

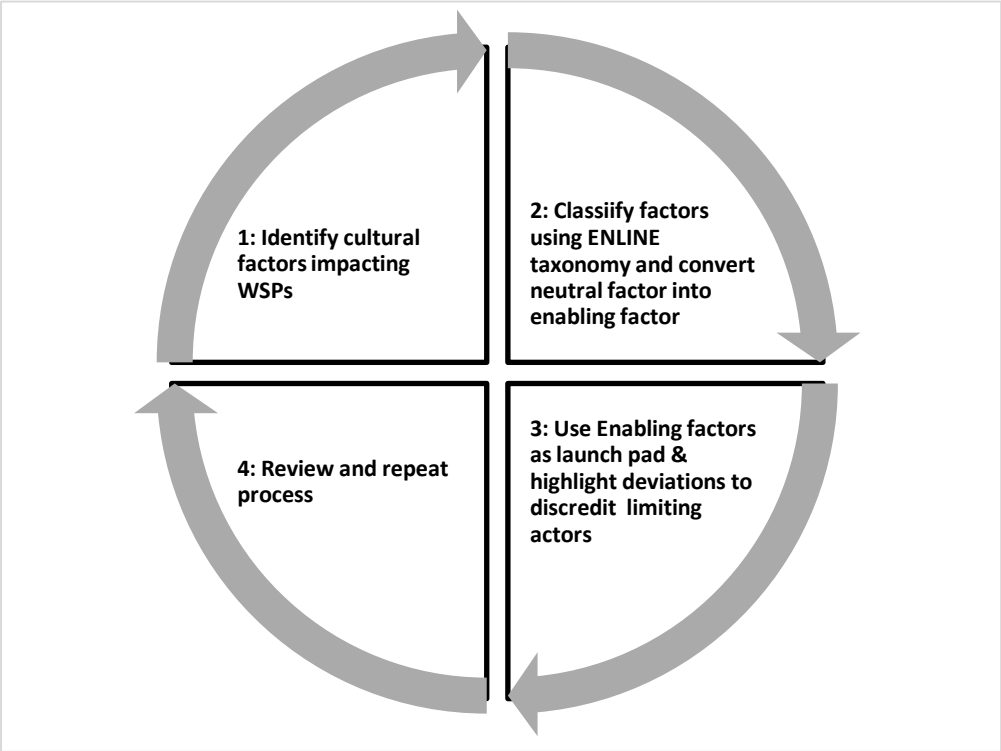

Figure 8-4: Culturally Adapted Risk Management Framework

The implementation of WSPs in developing countries can be impacted by beliefs about water in both positive and negative ways. The universal reverence for water linked to theistic beliefs can be used to bolster antipollution and conservation efforts.

Acknowledging that water is God's gift to human beings and educating the public on the need to recuperate supply costs might bring a resolution to the debate on whether water is a commodity or a human right. The performing of rituals that cause pollution of water sources and excessive water use in rituals can be challenged by highlighting the cultural deviations entailed in such practices. Engineers will have to be trained to consider the safety of water to be an integral part in its delivery. It would also be necessary to make customers aware of contamination risks they face during handling and storage of water. Finally, aesthetic preferences can be acknowledged in WSP efforts as important parameters that contribute to the process of delivering safe water that has the trust of customers.

8.7 Conclusion

In this chapter I have examined the operational and institutional environment of water utilities in developing countries. Culture in the study areas and its impact on WSP implementation has been discussed, and a culturally adapted risk management framework has been proposed. In the next chapter I will present the conclusions of this study and make some key recommendations.

9 CONCLUSIONS & RECOMMENDATIONS

9.1 Introduction

This chapter concludes the research. In the first section an overview of the research is presented in which the need for the research is revisited. This is followed by a discussion on the achievement of the research objectives and contribution to knowledge. Afterwards, the limitations of the research are indicated and in the penultimate section suggestions for further research are made. Finally, the chapter sets forth recommendations towards enhancing the implementation of WSPs.

9.2 An Overview of the Research

Access to safe drinking water is an integral part of human health and quality of life. The lack of such access in developing countries is linked to millions of deaths and DALYs annually. In order to tackle this grim situation the WHO and the IWA are promoting the use of WSPs, a comprehensive drinking water risks management approach that encompasses all stages of water supply from the catchment to the consumer.

Development scholars and practitioners do recognise the need to take culture into consideration as an important step in enhancing the likelihood of success of development projects and their sustainability. It is within this recognition that this research was commissioned by IWA to investigate the impact of culture on the implementation of WSPs in developing countries.

A multiparadigm approach combining interpretive and critical paradigms was adopted for this research. The multiparadigm approach taken here provided the context for selecting qualitative methodologies in which the case study approach was embraced. Inductive in its approach, data for this research was collected through semi-structured interviews, observations, and documentary analysis. Consulted for this research were water utility customers, and promoters and implementers of WSPs through fieldwork

conducted in India, Uganda, and Jamaica. Thematic analysis was used in analysing the collected data. To ensure validity and reliability, audio recordings of interviews, pictures, and video recordings of observations were kept. The chains of processes that lead to interpretations are presented within the thesis. Both researcher's and respondents' bias were minimized through different interview techniques while also engaging in some covert observations to minimize interference. To enhance this study's rigour, data triangulation and theory triangulation were also conducted.

This research may claim to be the first multi-country study that assesses the impact of culture on the implementation of WSPs in developing countries. This study has led to a better understanding of how culture impacts on the implementation of WSPs in developing countries through the achievement of the laid objectives. Explained below is how each of these objectives has been achieved.

9.3 Achievement of Research Aim and Objectives

The aim of this research is to elucidate how cultural factors impact on the implementation of WSPs in developing countries. Derived from this aim are the following three objectives:

1. Identify cultural factors that are affecting WSP projects in developing countries.
2. Investigate constraints to the transfer of WSP knowledge.
3. Develop a culturally adapted good-practice framework of risk-management in relation to water safety.

Outlined below is how each of these objectives was achieved.

9.3.1 Research Objective 1: Identify cultural factors that are affecting WSP projects in developing countries

This objective has been achieved through in-depth studies of WSP implementations in India, Uganda and Jamaica presented in Chapters 5, 6, and 7. As discussed in Chapter 8.5 almost a dozen cultural factors affecting WSP projects have been identified. The impacts of these factors on WSP implementation vary from positive to negative. Some of these factors, such as beliefs about water and aesthetic preferences have ultimate

influence on interaction with water. These inherent factors determine the perception of water and influence decisions such as bill payments and water consumption. Other factors such as pollution causing rituals and excessive water use in rituals are non-intrinsic. With these factors, it is not the rituals themselves that are the problem but rather it is the manner in which the practitioners interact with water. Other identified factors arise from the situation on the ground. Both the deliver-first safety-later attitude and the storage related practices can be linked to inability of the water utilities to adequately meet water demand. Finally, some of the identified factors have proximate influences. These factors which include knowledge management practices, authority orientation, corruption, and non-compliance are neither directly linked to nor limited to water.

9.3.2 Research Objective 2: Evaluate constraints to the transfer of WSP knowledge

Achievement of this objective is shown in section 8.5.2 where several constraints to the transfer of WSP knowledge most of which are linked to training are presented. The identified constraints include:

- Lack of or low levels of training opportunities
- Timing of training
- Negative attitudes towards training
- Lack of time to engage in training
- Negative attitude towards training material developed overseas
- Preference for oral delivery of training
- Frequent transfer of employees

9.3.3 Research Objective 3: Develop a culturally adapted good-practice framework of risk-management in relation to water safety

This objective is achieved through the development of a culturally adapted risk management framework presented in Section 8.6. Towards the development of this framework the above identified factors have been classified using ENLINE taxonomy that categorizes them into enabling, limiting and neutral in relation to WSP implementations as shown in Table 9-1.

Table 9-1: Cultural Factors Affecting WSP Projects

Enabling Factors	Limiting Factors	Neutral Factors
• Belief that water is a source of life and a medium for purification	• Belief that water should be free	• Authority orientation
• Aesthetic preferences	• Deliver-first safety-later attitude	
	• Pollution causing rituals	
	• Excessive water use in rituals	
	• Storage related practices	
	• Knowledge management practices	
	• Corruption	
	• Non-compliance	

Enabling cultural factors support the WSP philosophy, however, limiting cultural factors present barriers to WSP implementation. Neutral cultural factors neither support nor oppose the WSP philosophy and their impact depends on their utilization in relation to WSPs. One important finding is that all the limiting cultural factors are deviations from the cultural foundations on which they have been established.

As shown in figure 9-1, the framework has four steps beginning with the identification of cultural factors impacting WSPs. The next step involves the classification of the

identified factors using the ENLINE taxonomy and converting the neutral factor into an enabling factor. The third step involves the use of the enabling factors as a launch pad and highlighting the deviations to discredit the limiting factors. The fourth and final step involves reviewing and repeating the process.

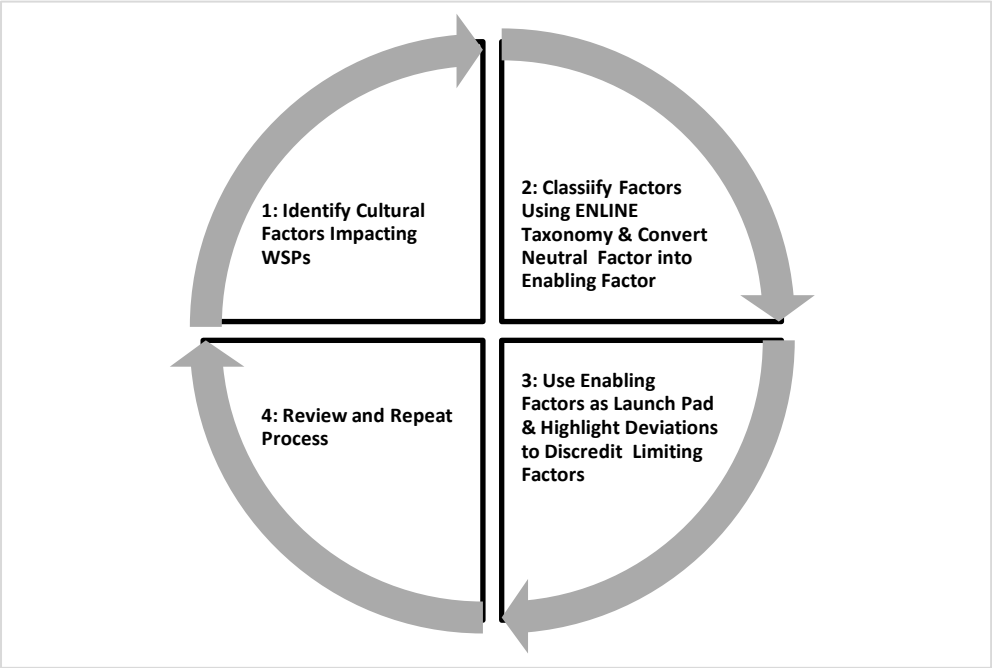

Figure 9-1: Culturally Adapted Risk Management Framework

9.4 Theoretical and Pragmatic Contributions

Building on the work of previous researchers a new definition of culture which can be used to describe culture at its different levels is proposed (Chapter 2.4.1). Thus culture is considered as *the learned dynamic patterns of social behaviour and attitudes based on underlying values and beliefs used by a group of people as a guide to interaction among themselves, with others, and with the world around them.*

Secondly, the ENLINE taxonomy for assessing the impact of culture on WSPs has been developed (Chapter 8.5). In this taxonomy cultural factors are viewed as being either enabling, limiting, or neutral towards the implementation of WSPs. Although this taxonomy might not be exhaustive, it clearly provides a foundation for identification and categorization of cultural impact.

Thirdly, a multidimensional theoretical framework for exploring the impact of culture on WSPs has been adopted (Chapter 3). This integrated framework enables the independent assessments of the external institutional environment (role of WSP promoters and social culture) and the organizational culture, and more importantly the interplay between them. This framework advances the use of cultural theories in institutional theory and addresses challenges pointed to within this theory.

Fourthly, and most significantly, is the development of a theoretical framework for addressing the impact of culture on the implementation of WSPs (Chapter 8.6). This framework can be adapted to address the impact of culture on other development projects.

9.5 Limitations of the Research

- The study was limited to three English speaking countries.
- This research relied on voluntarily disclosed information and the level of access granted. Useful information which could have enhanced the outcomes might have been withheld.
- The data was interpreted by one person leaving out room for other possible interpretations.
- All the utilities studied here are government owned

9.6 Suggestions for Further Research

- Testing of the culturally adapted risk management framework to enhance its generalizability and application in addressing the impact of culture in other development projects
- Further validation of the findings to enhance generalizations in developing countries through more research
- Assessment of factors that lead to indication of customer satisfaction with provided service despite poor service provision
- Examination of the effect of fatalistic beliefs on the adoption of risk management practices
- Development of tools aimed at creating awareness of safe stored water handling and tools aimed at changing behaviours in handling stored water

9.7 Recommendations

A WSP is an integrated risk management approach that incorporates activities taking place from the catchment to the consumer. In essence WSPs are a shift from a reactive to a pro-active way of doing things. The positive implications of such a shift, if adopted and implemented, can be massive. The successful management of drinking water risks in developing countries will require a broad institutional approach and a concerted effort that involves institutions beyond the water utilities. WSPs in developing countries can have the impact of transforming the water sector and reshaping the development process. It is with this in mind that the following targeted recommendations are made.

9.7.1 Need for Good Governance

Good governance is an important precursor to and a critical component of achieving development goals such as the protection of public health towards which WSPs are aimed. While the achievement of good governance in its entirety is an ideal, some of its basic components must be present to allow development. Effective and sustainable implementation of WSPs will at the very basic level require rule of law and transparency. This requires fair legal frameworks and their impartial enforcement whereby decisions taken are grounded on rules and regulations. In order to achieve these, efforts have to be made towards the creation of an independent judiciary and an incorruptible police force. Achieving these will ensure accountability at the customer, utility, and government levels and boost the likelihood of successful implementation WSPs.

The ownership of water utilities by government, as seen in this research, presents challenges for utilities. Even without getting entangled in the debate on privatization, governments can take an arm's length approach and empower utilities by giving them the autonomy and support they require. Government support is urgently needed in infrastructure investments and provision of better access for the urban poor. Infrastructure investment will enhance effectiveness and efficiency; key components of good governance, of water utilities by enabling them meet societal water needs while making optimal use of water resources. Better access for the urban poor will cover the

equitable and inclusive characteristic of good governance by providing vulnerable members of society with opportunities to better their lives.

WSP promoters, implementers, and utility customers ought to engage in activities aimed at working towards the attainment of good governance for without it achieving the goals of WSPs will at the very least be very difficult.

9.7.2 Embracing WSPs

Embracing WSPs presents water utilities with a holistic approach to addressing many of the challenges in which they have been mired in. The first step towards this would be securing leadership buy-in. Since these utilities are government owned, this buy-in must not only be obtained from the utility's senior management but also from political leaders and also preferably from senior civil servants who are likely to remain in office in case of a government change. Promoters have to create a full understanding of WSPs. After achieving this, commitment and action plan have to be obtained. At the government level this can include commitment letters at the initial stages and at the utility level an embracement plan. In hierarchical societies where leaders have enormous influence, besides having them sold on WSPs, it would even be more beneficial if they were promoting it. From the onset, all participants need to be made aware that WSPs are not a onetime exercise, but rather a permanent and continuous process. The necessity to have the WSP process internalized rather than taking it as an add-on exercise has to be clearly conveyed.

9.7.3 Institutionalizing WSPs

Embedding WSPs into policies and legislations would be a foremost step towards translating it into action guidelines and integrating it into the management of drinking water resources. Developing countries need to develop and enforce policies and legislations that will lead to progress and development. Legislating water safety plans will make it an integral part of water provision and contribute to entrenching it in the system. Legislation has to be thought out properly, be practical and enforceable.

Educating and training current and future water and environmental professionals on WSPs is also an integral aspect towards its institutionalization. Providers of tertiary

education aimed at training water and environmental professionals ought to include WSPs in their core curriculums.

Since WSP is a proactive process that requires the everyday reactive way of doing business to change, the principles of forward-thinking, planning and prevention ought to be instilled. The various local agencies involved in water management have to truly co-operate among themselves for the sake of the process and have to stop turf wars and other forms of negative competition. There is a need to share experiences both good and bad and not viewing WSP as a fault finding mission aimed at generating blame. In addition, stakeholders from the catchment have to be involved in the process in order to maintain the catchment to consumer aspect of WSPs.

WSP promoters have taken a commendable step that gives governments and water utilities in developing countries a clear path to attaining water safety. These organizations have been catalysts in the development and implementation of WSPs and in its propagation. Institutionalizing WSPs will take time and will need resources; the promoters ought to continue providing the necessary support required to achieve this.

9.7.4 Addressing Limiting Cultural Factors

1 Fighting Corruption and Improving Compliance

Corruption and non-compliance are two interlinked cultural factors that can be effectively dealt with within the realm of good governance. In particular, creating an independent judiciary and an efficient police force would be vital.

2 Counteracting Belief that Water should be Free

Beliefs are shaped by knowledge acquired in a given cultural context and as such beliefs can also be changed through the acquisition of new knowledge. The best possible way to counteract the belief that water should be free is acknowledging that water is free but its sourcing, treatment and delivery costs money. This message can be delivered through social, religious, educational, and legal institutions. It is essential to attach cost to water and make the people understand the relationship between service and bill payment. The ability to pay and the willingness to pay has to be differentiated.

3 Changing Deliver-First Safety-Later Attitude

The relegation of water safety among engineers is an attitude shaped by the obvious water needs. While the pressure to meet quantity needs is driving this attitude, an understanding that quantity without quality undermines the health objectives of water provision has to be created. At the moment WSPs seem to be centred in quality control/treatment departments. Extending WSPs beyond these departments is clearly needed. In addition to providing WSP training to engineers, WSPs ought to be included in all their delivery activities.

4 Tackling Pollution Causing Rituals

The finding of pollution causing rituals could be used to symbolise the wider spread problem of water pollution. Pollution of water sources can render potential sources of water unusable, increases health risks and treatment costs for water utilities. It could be argued that the pollution of water sources through activities endorsed by important social institutions could be indicative of larger underlying issues when it comes to pollution of water sources. Public education backed up by deterrence is required to deal with this challenge.

5 Addressing Excessive Water Use in Rituals

Excessive water use in rituals highlights the need for water demand management. This finding symbolises the wider problem of water wastage. Some implementers in the three cases have shown concern with the wastage of water indicating the need to manage demand. The excessive use of water limits WSP efforts because efforts to meet demand shift the focus on quantity issues thus relegating quality aspects. Educating the public on the necessity and urgency of water conservation through the social forums in which such rituals occur will provide a good platform for promoting water demand management. Water conservation should be taught in schools and through public campaigns. Installation of water saving devices should be encouraged.

Water demand management has to be a key component of ensuring water safety especially given declining availability and increasing populations. Institutions such as mosques can be used to educate the public on the need for water conservation. Cultural values that promote the conservation of water can be used to bolster this message. Price mechanisms can also be used as appropriate tools in managing water demand. In

addition to this, water utilities will also have to address transmission and distribution loses. Improving water use efficiency presents an opportunity to resolve quantity related challenges and enhance efforts in water quality management.

6 Bettering Storage Related Practices

Given the immensity of water storage resulting from intermittent supply in most developing countries, it would be crucial for WSP efforts to be further shifted from the taps to the storage vessels till when reliable supply is achieved. These efforts should be aimed at targeting intra-household contamination and will require a stronger software component in WSP projects addressing waters sanitation and hygiene issues. There is a need for a value shift, the way people interact with water. For example, the basic manners of using water have to be taught in schools and to the public.

Findings on the handling of stored water by water utility and public health officials in one of the cases indicates the need to move beyond creating awareness of safe water handling to the need to undertake behaviour modification training aimed at changing stored water handling behaviours.

Tools aimed at creating awareness of safe stored water handling and tools aimed changing behaviours in handling stored water can be included in the WSPortal.

7 Improving Knowledge Management Practices

The findings point to several gaps in knowledge management practices particularly in the collection of data and its utilization and in knowledge dissemination. The following recommendations address these gaps:

- Enhance data collection and reliability through improved capability e.g. investment in equipment, labs etc, training of data collectors, use of appropriate methods and data sources.

  The WSPortal can include tools on data collection techniques, methodologies, and suggestions on affordable and reliable equipment. A forum for exchanging ideas and sharing experiences on data collection can make significant contributions.

- Easing both inter and intra agency data sharing

  The WSPortal can have generic applications that facilitate and ease data sharing which can be downloaded by water utilities and other stakeholders. These applications can trigger alerts for example when certain parameters are beyond or below the safety standards.

- Improving data utilization

  The generation of reliable data and its conversion into useful and accessible information will play a key role in the success of WSPs in developing countries. There are many instances where data is collected but not utilized, findings point to under-utilization of data. In order to address this it would be necessary to:

  - Have a clear understanding of what the purpose of the collected data is and clarity on the responsibility of its utilization.
  - Timely utilization of collected data
  - Continual assessment of data and investigation of patterns
  - Including data assessment in management requirements such as reports

- Enhancing knowledge dissemination

The following recommendations are aimed at enhancing knowledge dissemination through its various channels:

- Increased provision of in-house training within utilities
- Workshops and seminars in developing countries which should include visits to treatment plants
- Use of technology to share workshops through live broadcast especially in cases where travel is difficult
- Holding periodic interdepartmental presentations for sharing knowledge within utility and WSP teams.

When it comes to training, the following suggestions can tackle the identified constraints to knowledge transfer:

- The need to disassociate staff training with punishment. Training should not be used as a punishment post or a dumping place
- Viewing training as an ongoing and continuous process
- Training not being supply sided alone but also being a demand issue
- Setting aside a certain percentage of project development funds for training
- Having clear training incentives
- Regular training of the trainers
- Assessment of training demand by the training institution instead of the organization
- Even though it is essential to train managers first, non managerial employees have also to be made aware of what the WSP process is and what it stands for; it is important that this is done from the beginning of the process

The implementation of WSPs needs time and it will be more so in developing countries where the challenges are immense. Addressing the impact of culture on WSPs implementation will also require time. The time needed to address most of the limiting factors will vary from medium term to long term. In the spirit of risk management practice, the implementation of WSPs has to be viewed as requiring continuous improvement where its design is appropriate to the local cultural context. Such implementation ought to be responsive and as shown in WSPs steps must include feedback to its design. One such example is the need to shift the end point of the process from taps to the point of consumption where in many developing countries it is the storage vessel.

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APPENDIX A: INTERVIEW GUIDE

There are several typologies of interview relations from the interviewees' point of view. Masarik (1981, cited in Wengraf 2001) makes the following distinctions:

- **Hostile interview** where the interviewer is the *enemy* and there is a fight for information
- **Limited survey interview** occurs when the interviewer seems robotic, hitting certain buttons to bring out a mechanical response.
- **Rapport interview** happens when the interviewer comes out as a *human-being* performing a task. The interviewer accepts and recognises the interviewee's humanity while at the same time remaining focused on the issue at hand.
- **Asymmetrical-trust interview** takes place when one side is seen as a source of advice and wisdom while the other side is seen as a petitioner.
- **Depth-interview** happens when the interviewer and interviewee meet as equals who express their humanities in a confined manner while maintaining the importance of the task.
- **Phenomenal-interview** occurs when the interviewer and the interviewee become caring companions who richly and actively reveal their respective humanities while maintaining a commitment to develop understanding.

Interviewing Conceptual Frameworks

The following interviewing conceptual frameworks provide guidance on conducting interviews:

Symbolic Interactionist Model.

Foddy (1993) suggests the manner in which the meanings of questions and answers are negotiated between the interviewer and respondent. This framework is built on coding and decoding of messages. The model, as shown in Figure 10-1 portrays that question answer behaviour involves a four-step communication cycle.

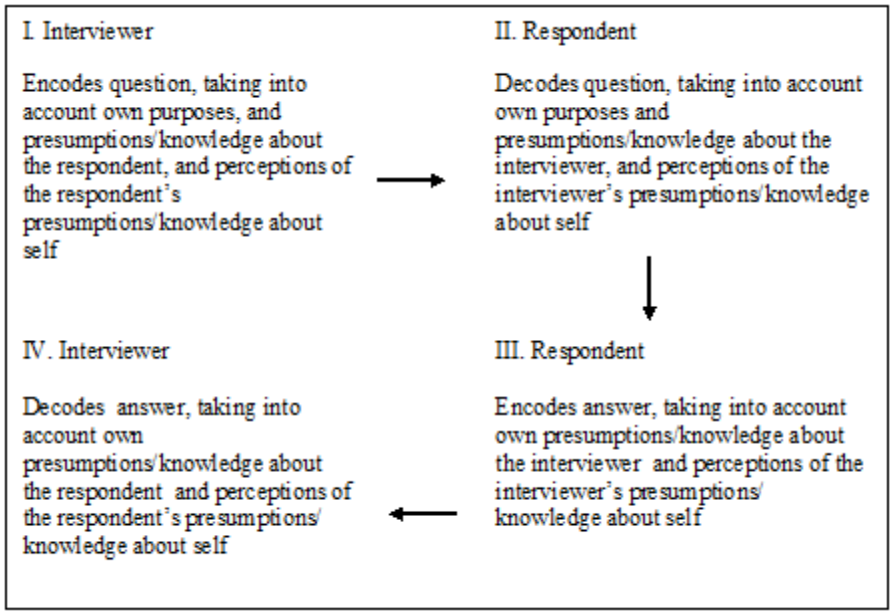

Figure 10-1: Foddy's Symbolic Interactionist Model (Foddy, 1993)

Foddy's model stresses that for successful communication, understanding of the question ought to be as intended by the interviewer, and understanding of the answer ought to be as intended by the interviewee.

Briggs-Wengraff Model of Components of the Interview Situation

Briggs-Wengraff model (Figure 10-0-2) recognises that both the interviewer and the informant come to the interview carrying both their personal negative and positive histories. The solid black line at the centre of the diagram represents the relationship and communication between the interviewer and the informant. Wengraff (2001) stresses that although an individual's purpose may be one thing; there may be real or suspected unofficial purposes which are prone to affect the outcome. This shows varying interactional goals and strategies.

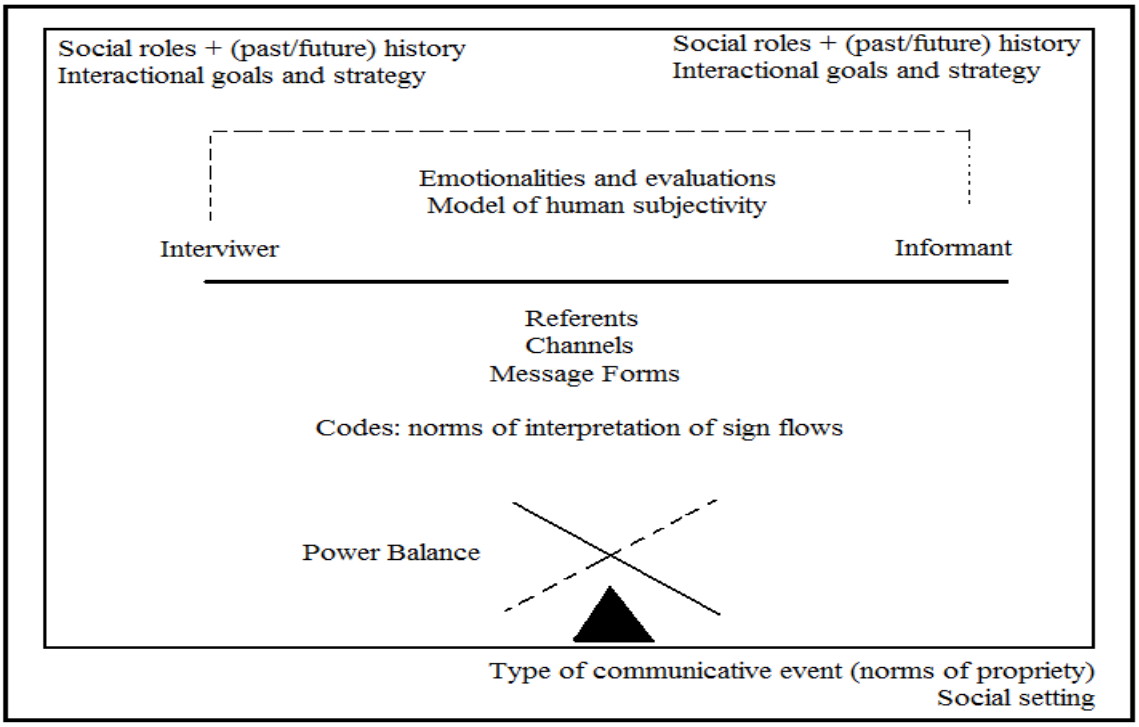

Figure 10-0-2: Briggs-Wengraff Model of Components of the Interview Situation (Wengraff, 2001)

The model recognises that at any given time both the informant and the interviewer will be going through certain emotions ranging from the imperceptible to over the top. The way the interview is understood will depend on the participants' concept of human subjectivity. The type of communicative event, with its norms of propriety, might mean different constructions by the parties. For example, where the researcher may see the event as a professional operation, the informant may consider it as a favour to a friend or a power figure.

Wengraff (2001) stresses the importance of having absolute clarity on the referent and awareness of the manner in which messages are conveyed. Thinking that messages are only conveyed acoustically through voice or even worse, thinking that meaning is only being conveyed through spoken words would result in narrow conception. Paying attention to non-verbal communication and how the words are said such as picking on ironical tone will ensure meaning is not lost. Capturing the tone of voice, speed of delivery and the hesitations will reveal more than can be presented in a transcript of the

words. In cases where translators are used, the question of how well the translation is being done will arise.

Social setting refers to factors such as local physical and social arrangement, type of day, time of day and social constraints and interruptions, all of which need to be considered. These considerations were of particular importance when dealing with people who had different cultural values.

Wengraf (2001) points out most private spaces are liable to overhearing and interruptions while public spaces have their distractions. A neutral space is recommended unless clues are being sought from the informant's surroundings. Wengraff (2001) also mentions the importance of sequencing in an interview. Placing a question at the beginning or at the end of an interview might result in different answers. Robson (2001) recommends doing the interview in the following order:

1. **Introduction**- A personal introduction followed by explaining purpose of interview, assuring confidentiality and asking for permission to record and make notes

2. **'Warm-up'**- Use of non-threatening questions to allow both the interviewer and the informant to settle down

3. **Main body**- Covers main aim of the interview in a topical progression, leaving risky questions to the end.

4. **'Cool-off'**- some straight forward questions at the end to diffuse any built up tension.

5. **Closure**-Thanking the informant and saying goodbye.

Probing

Bernard (2006) describes probing as the key to successful interviewing and identifies the following main types of probing:

- **The silent probe**- being quiet and waiting for the informant to continue. Requires practice and recognition of the end of speech.

- **The echo probe**- useful when the informant is describing a process event. Although it encourages the informant to continue with the narrative, overdoing might lead the informant to ask why the researcher keeps repeating what they said.
- **The uh-huh probe**- encourages the informant to proceed with the narration by making affirmative comments such as uh-huh and yes ,I see.
- **The tell me probe**-after getting an answer the researcher probes for more by posing questions such as 'could you tell me more about that ?', 'why exactly do you feel that way?'.
- **The long question probe**- According to Bernard, there is nothing quiet as useful as the 'grand tour question' in breaking the ice and getting the interview to flow. However, Robson (2006) discourages the use of long questions pointing out that respondents may only remember a part.
- **Probing by leading**- Bernard (2006) advices against being cautious in an interview. Instead he advices on learning to use leading questions well. He points out to start some probes with "This might be obvious to you...." in order to avoid irritating the informant and create awareness that you are not at the same level as them. This is another type of questioning Robson (2006) advices against.
- **Baiting/pleased assertion probe**- This occurs when the researcher acts like s/he knows something in order to get informants to open up. The informant would feel like they are not the ones giving away the secrets of the group and as the researcher continues to learn more and more pieces of the puzzle from the informants, the more information they are willing to share.

APPENDIX B: INTERVIEW QUESTIONS

Customer Interview

Personal details**:** name; gender; age; home area; religion; water provider; service level; occupation; education.

How would you describe your culture?

Is there any other way you would describe your culture?

Can you tell me about your water situation? *What words can you use to describe your water? Do you pay? How much do you pay? Do you like it?*

How do you know your water is safe to drink?

Do you store your drinking water? *What type of storage do you have?*

Do all people get their water from the same source?

What do you use your water for? *Could you please rank these uses from the most to least important? How many litres do you use for each activity?*

Has your water supply changed in any way over the past months/years?

How is water seen in your culture? *How is paying for water viewed?*

How would you describe your water supplier? *What do other people say about your water supplier?*

What does trust mean to you? *What does trust mean to the people of this city/town?*

Do you trust the water utility?

Do you trust the water?

If something went wrong with your water what would you do?

When people get sick here what do they get sick from?

What type of law does this country have?

Would you say these laws are followed: Always, most of the times, sometimes, never

Are there any laws for water? *What are they?*

Who is the head of this house? *How is he or she viewed? Why are they the head? If someone disagrees on an issue with him /her, how is it addressed?*

Do you think customers need information on their water? Why? What kind?

Have you received any information about water? *From whom? How was it delivered? What use did it have?*

In what format would you prefer information (1.oral –door to door, radio, community seminar 2. written-leaflets, ad in local papers 3. pictures- cartoon drawings, short clips

What type of information would you want or expect to find?

What would make you go or not go to a seminar on water safety provided to customers?

What do you think of corruption in this country?

How would you describe corruption? *What is corruption?*

How does corruption affect water provision?

Promoter Interview

Personal details: name; gender; age; home area; religion; water provider; service level; occupation; education.

How did you end up working here? *Why did you want this job?*

What is it like to work in this organisation? *How would you describe it to a friend?*

What do you consider to be the main priority in this organisation? *What do your colleagues consider to be the main priority? Is this the right priority?*

What lessons have you learned from working in this organisation?

Where do you see this organization in 10, 20, 50, years?

If you could change anything in this organisation, what could it be?

What does trust mean to you? What does trust mean to the people of this city/ town?

Please describe any major changes there have been in this organisation.
How did your organisation become involved in WSP work in this area? Who decided?

How were the decisions made? *By whom; how; why made in this manner?*

Were you involved in the decision making process or given a chance to give your opinion?

How are disagreements resolved in this organization?

In how many developing countries have you been involved in WSPs?

What are the positive and negative aspects of having expatriates in WSP work in developing countries?

What cultural lessons have you learned in spreading WSPs in developing countries?

Do you think WSPs address all water safety needs for developing countries?

What challenges did you meet in spreading WSPs to developing countries?

What would make WSPs successful in developing countries?

How did you improve or make WSPs more adoptive in this area?

How do you see employee training in your organization? How do others view it?

Do you have training procedures/programmes in your organisation? *Please describe them?*

How do you teach WSPs to utilities? Does the approach vary?

What has been most effective in your WSP training?

What were the main challenges during training?

While in training were there any special considerations taken into account?

How are WSP teams guided to acquire additional skills?

What sources of information do you recommended to WSP implementers?

Are there any additional sources of information that you would have liked to see developed?

When choosing a source of information to recommend what are your main concerns?

Implementers Interview

Personal details: Name; Gender; Age; Home area; religion; Water provider; Service level; Occupation; Education.

How would you describe your culture?

Is there any other way you would describe your culture?

How did you end up working here? *Why did you want this job?*

What is it like to work in this organisation? *How would you describe it to a friend?*

What do you consider to be the main priority in this organisation? *What do your colleagues consider to be the main priority? Is this the right priority?*

What lessons have you learned from working in this organisation?

Where do you see this organization in 10, 20, 50, years?

If you could change anything in this organisation, what could it be?

What does trust mean to you? What does trust mean to the people of this city/ town?

Please describe any major changes there have been in this organisation.

How were the decisions made? *By whom; how; why made in this manner?*

How are disagreements resolved in this organisation?

How was your organisation chosen to be a pilot? *Who decided? Were you involved in the decision making process or given a chance to give your opinion?*

Why are WSPs being developed in this country? *Who came up with the idea?*

What roles do your local, regional and national governments play?

What do you expect to gain from being a pilot? *Are you gaining it?*

What would make WSPs successful in this country?

What type of law does this country have?

Would you say these laws are followed: Always, most of the times, sometimes, never

Has politics had any impact on your work?

Who are involved in your WSPs? *Why these people? Basis for inclusion?*

How is the team leader chosen? What are the main qualities sought in a team leader?

What happens when there is disagreement in the team?

What is the process for implementing change?

Is there an individual or team from your organization designated to work on WSP on a full time basis?

What words would you use to describe the community you serve?

Is there a procedure for customers to complain about their water? Please describe it, how effective is it?

How do you deal with illegal settlers affecting the catchment or pipeline?

How do you convince consumers that the tap water is safe to drink?

What do you think do your customers think of the water you serve them and your organisation?

What do you think of corruption in this country?

How would you describe corruption?

How does corruption affect water provision?

What role can consumers play to ensure a successful WSP?

Who is funding the WSP pilot?

Is the WSP cost what it was expected to be or more?

Is the WSP cost what it was expected to be or more?

Did you have to increase your running budget because of WSPs, by what percentage? Where did the funds come from?

What words would you use to describe the International organisations you are working with? How are they perceived in your organisation?

What are the positives and negatives of having a foreigner work on local WSP projects?

How could the donors improve the programme? If you could, what changes would you make in donor world? Communities? Government?

How do you conduct your risk assessment? *How is risk viewed in this organisation?*

*H*ow do you monitor your water quality? *Has this changed since the WSP? Is the change necessary?*

How do you classify/prioritize your risks? *According to their likelihood/frequency, severity/consequences?*

How would you describe the control measures in the system in terms of efficiency and necessity?

When deciding control measures such as chemical dosage for chlorine, what considerations do you take?

Do you have an emergency procedure? What are the plans for emergency water supply? What are procedures for notifying staff, regulatory organisations, & public? Are there mechanisms for public health surveillance?

For small water systems what are you using/planning to use? *Generic water safety plans or safety plan guides?*

In your monitoring plans, how is the reporting and communication of results ensured?

When taking corrective action who has to be informed?

What type of record keeping forms do you use? *Did you have to change any of the generic WSP forms that are used for record keeping? Why?*

What did you hope for from the WSPs? Do you feel you have got this? *Why/how?*

In implementing this pilot, what have been your most difficult challenges?

In relation to this pilot what accomplishment is your organisation most proud of? *How did you achieve them?*

How do you see employee training in your organization? How do others view it?

Since you joined this organisation have you been on any training? *Could you please describe it? Who arranged it? Who paid for it?*

Do you teach your customers anything about water? *What? How?*

Who are/were your WSP trainers? *How would you describe them?*

While in training were there any special considerations taken into account

During training would you have preferred to have some things done differently? Like what?

How does the team acquire additionally required skills?

How many departments are involved in WSP? *How were they taught about WSPs? Have you managed to cascade the WSP to all members of the organisation? How did you do it, how did you reach peripherally housed staff e.g. treatment plant?*

During training or implementation was there any confusion in terminology? For example?

How would you describe the support you received as a WSP pilot?

What supporting programmes or information were/are most useful in your WSP? *Why?*

Where do you get the information you use for your WSP work?

What additional sources of information would you like to see developed? *In what format would you prefer this information to be? Please rank (booklets, brochures, pamphlets, CDs, internet)*

Is there any particular area in which you would have liked more information?

Do you use the internet? Other than the information, what do you like about the sites you visit?

Are there any changes you would have liked to see in these/this site(s)? Do you use the internet to get any information on WSP? *Which sites? What information?*

APPENDIX C: WATER USAGE IN MOSQUES

Introduction

As in other religions, water is used in Islam to perform different religious rituals. One of these rituals is pre-prayer ablution commonly referred to as wudhu. Muslims have to perform five obligatory prayers each day and before engaging in these prayers they perform wudhu whereby they wash their limbs and face. During a visit to cultural places in Hyderabad, a caretaker in a mosque raised the issue of excessive water usage during this ritual. This information prompted the author to investigate the levels of water usage during wudhu in mosques in Hyderabad, Kampala, and Spanish Town.

Method

Two locals were recruited in each case to collect water that was flowing from the taps during ablution. The purpose of the collection was not disclosed. The sampling was random in which every 2nd person was selected for a total of 10 persons. Two different prayer times were chosen, the mid-day and the sunset prayer times.

Water was first collected in basins. These basins were placed on the floor under the taps in order to collect all the water flowing from the taps. Water in the basin from each individual was then transferred into bales from where they were measured using calibrated plastic jugs and the measurements recorded.

Results

The results displayed in Table A below shows that the water used in ablution ranges from a high of ten litres to a low of three litres across the three cases. The average usage during the mid-day prayer is 5.84, 5.15, and 5.94 for Hyderabad, Kampala, and Spanish Town respectively. The average usage for the sunset prayers are 5.01, 3.66, and 4.9 litres for these locations respectively. The overall average water usages per ablution are 5.4, 4.4, and 5.4 litres in Hyderabad, Kampala, and Spanish Town respectively.

Table A: Water Usage in Mosques

	Hyderabad	Kampala	Spanish Town
	Water Usage (Litres)		
Mid-day Prayer	9	4	6.5
	5.2	5.6	7.3
	5.5	4.2	6.2
	6.2	4	10
	6.2	6.1	6.3
	5	4	4
	5	5.8	5.3
	6	7	5.6
	5	5.4	4
	5.3	5.4	4.2
Average	5.84	5.15	5.94
Sunset Prayer	6	4	6
	6.3	4.2	4
	5	4	5.4
	5.2	3	4.6
	5.9	3.5	4
	5.7	3	6
	4	4	4
	4	4	4.5
	4	3.9	6.5
	4	3	4
Average	5.01	3.66	4.9
Overall Average	5.4	4.4	5.4

Conclusion

The ablution water usage in the three cases indicates usage beyond the half a litre quantity recommended in the religious guideline. This means an excessive use of nearly twenty litres of treated water per ablution per individual per day. While this amount of water might not be a lot, the numbers can be very significant in countries with large Muslim populations most of which are water stressed.